

QUALITY ASSURANCE PROJECT PLAN
29 Riverside Avenue Site (Phase 2 Assessment)
Newark, New Jersey

Prepared for:
United States Environmental Protection Agency/Environmental Response Team
Edison, New Jersey

By:
Lockheed Martin/Scientific, Engineering, Response and Analytical Services (SERAS)
Work Assignment Number: SERAS-089

Based on the Intergovernmental Data Quality Task Force Uniform
Federal Policy for Quality Assurance Project Plans
(Final Version 1.1, June 2006)

June 23, 2010

TABLE OF CONTENTS

QAPP Worksheet #1. Title and Approval Page	1
QAPP Worksheet #2. QAPP Identifying Information	2
QAPP Worksheet #3. Distribution List	7
QAPP Worksheet #4. Project Personnel Sign-Off Sheet	8
QAPP Worksheet #5. Project Organizational Chart	9
QAPP Worksheet #6. Communication Pathways	10
QAPP Worksheet #7. Personnel Responsibilities and Qualification Table	11
QAPP Worksheet #8. Special Personnel Training Requirements Table	12
QAPP Worksheet #9. Project Scoping Session Participants Sheet	13
QAPP Worksheet #10. Problem Definition	14
QAPP Worksheet #11. Project Quality Objectives/Systematic Planning Process Statements	15
QAPP Worksheet #12. Measurement Performance Criteria Table	16
QAPP Worksheet #13. Secondary Data Criteria and Limitations Table	26
QAPP Worksheet #14. Summary of Project Tasks	27
QAPP Worksheet #15. Reference Limits and Evaluation Table	28
QAPP Worksheet #16. Project Schedule Timeline Table	40
QAPP Worksheet #17. Sampling Design and Rationale	41
QAPP Worksheet #18. Sampling Locations and Methods/SOP Requirements Table	42
QAPP Worksheet #19. Analytical SOP Requirements Table	45
QAPP Worksheet #20. Field Quality Control Sample Summary Table	47
QAPP Worksheet #21. Project Sampling SOP References Table	48
QAPP Worksheet #22. Field Equipment Calibration, Maintenance, Testing, and Inspection Table	49
QAPP Worksheet #23. Analytical SOP References Table	50
QAPP Worksheet #24. Analytical Instrument Calibration Table	51
QAPP Worksheet #25. Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	52
QAPP Worksheet #26. Sample Handling System	53
QAPP Worksheet #27. Sample Custody Requirements	54
QAPP Worksheet #28. QC Samples Table	55
QAPP Worksheet #29. Project Documents and Records Table	79
QAPP Worksheet #30. Analytical Services Table	80
QAPP Worksheet #31. Planned Project Assessments Table	81
QAPP Worksheet #32. Assessment Findings and Corrective Action Responses	82
QAPP Worksheet #33. QA Management Reports Table	83
QAPP Worksheet #34. Verification (Step I) Process Table	84
QAPP Worksheet #35. Validation (Steps IIa and IIb) Process Table	85
QAPP Worksheet #36. Validation (Steps IIa and IIb) Summary Table	86
QAPP Worksheet #37. Usability Assessment	87
FIGURE 1. Site Location Map	

**QAPP Worksheet #1
(UFP-QAPP Section 2.1)
Title and Approval Page**

Site Name/Project Name: 29 Riverside Avenue Site (Phase 2 Assessment)

Site Location: Newark, New Jersey

Document Title: Quality Assurance Project Plan for 29 Riverside Avenue Site (Phase 2 Assessment)

Lead Organization: Environmental Protection Agency/Environmental Response Team (EPA/ERT)

Preparer's Name and Organizational Affiliation: Martin Ebel, Lockheed Martin/Scientific, Engineering, Response and Analytical Service (SERAS)

Preparer's Address, Telephone Number, and E-mail Address: 2890 Woodbridge Avenue, Edison, New Jersey 08837, (732) 321-4269, martin.t.ebel@lmco.com


Preparation Date (Day/Month/Year): 23 June 2010

Investigative Organization's Project Manager/Date: 
Signature

Printed Name/Organization: Don Bussey/ERT Work Assignment Manager

Investigative Organization's Project QA Officer/Date:  6/25/10
Signature

Printed Name/Organization: Stephen Blaze/ERT Quality Coordinator

Lead Organization's Project Manager/Date: 
Signature

Printed Name/Organization: Martin Ebel/SERAS Task Leader

Approval Signatures/Date:  6/24/10
Signature

Printed Name/Title: Deborah Killeen/SERAS QA/QC Officer

Approval Authority:

Other Approval Signatures/Date:  6/24/10
Signature

Printed Name/Title: Dennis A. Miller/SERAS Program Manager

Document Control Numbering System: SERAS-089-DQAPP-062310

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP
Revision Number: 0.0
Revision Date: 06/23/10
Page: 2 of 88

QAPP Worksheet #2
QAPP Identifying Information

Site Name/Project Name: Phase 2 Assessment Riverside Avenue Site

Site Location: Newark, New Jersey

Site Number/Code: 02PC

Operable Unit:

Contractor Name: Lockheed Martin

Contractor Number: EP-W-09-031

Contract Title: SERAS

Work Assignment Number: SERAS-089

1. Identify regulatory program: Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)

2. Identify approval entity: EPA/ERT for Region 2

3. The QAPP is (select one): ☐Generic ☒Project Specific

4. List dates of scoping sessions that were held: NA

5. List dates and titles of QAPP documents written for previous site work, if applicable:

Title	Approval Date
-------	---------------

Quality Assurance Project Plan for Riverside Avenue Site, Newark, New Jersey, Response Scientific Engineering Response and Analytical Services (SERAS), document # SERAS-049-DQAPP-032210	03/22/10

6. List organizational partners (stakeholders) and connection with lead organization:
EPA Region 2

7. List data users:
EPA Region 2

8. If any required QAPP elements and required information are not applicable to the project, then circle the omitted QAPP elements and required information on the attached table. Provide an explanation for their exclusions below:

QAPP Worksheet #2
QAPP Identifying Information
(Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
Project Management and Objectives		
2.1 Title and Approval Page	- Title and Approval Page	1
2.2 Document Format and Table of Contents 2.2.1 Document Control Format 2.2.2 Document Control Numbering System 2.2.3 Table of Contents 2.2.4 QAPP Identifying Information	- Table of Contents - QAPP Identifying Information	2
2.3 Distribution List and Project Personnel Sign-Off Sheet 2.3.1 Distribution List 2.3.2 Project Personnel Sign-Off Sheet	- Distribution List - Project Personnel Sign-Off Sheet	3 4
2.4 Project Organization 2.4.1 Project Organizational Chart 2.4.2 Communication Pathways 2.4.3 Personnel Responsibilities and Qualifications 2.4.4 Special Training Requirements and Certification	- Project Organizational Chart - Communication Pathways - Personnel Responsibilities and Qualifications Table - Special Personnel Training Requirements Table	5 6 7 8
2.5 Project Planning/Problem Definition 2.5.1 Project Planning (Scoping) 2.5.2 Problem Definition, Site History, and Background	- Project Planning Session Documentation (including Data Needs tables) - Project Scoping Session Participants Sheet - Problem Definition, Site History, and Background - Site Maps (historical and present)	9 10
2.6 Project Quality Objectives and Measurement Performance Criteria 2.6.1 Development of Project Quality Objectives Using the Systematic Planning Process 2.6.2 Measurement Performance Criteria	- Site-Specific PQOs - Measurement Performance Criteria Table	11 12

QAPP Worksheet #2
QAPP Identifying Information
(Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
2.7 Secondary Data Evaluation	<ul style="list-style-type: none"> - Sources of Secondary Data and Information - Secondary Data Criteria and Limitations Table 	13
2.8 Project Overview and Schedule	<ul style="list-style-type: none"> - Summary of Project Tasks 	14
2.8.1 Project Overview	<ul style="list-style-type: none"> - Reference Limits and Evaluation Table 	15
2.8.2 Project Schedule	<ul style="list-style-type: none"> - Project Schedule/Timeline Table 	16
Measurement/Data Acquisition		
3.1 Sampling Tasks	<ul style="list-style-type: none"> - Sampling Design and Rationale 	17
3.1.1 Sampling Process Design and Rationale	<ul style="list-style-type: none"> - Sample Location Map 	18
3.1.2 Sampling Procedures and Requirements	<ul style="list-style-type: none"> - Sampling Locations and Methods/SOP Requirements Table 	19
3.1.2.1 Sampling Collection Procedures	<ul style="list-style-type: none"> - Analytical Methods/SOP Requirements Table 	20
3.1.2.2 Sample Containers, Volume, and Preservation	<ul style="list-style-type: none"> - Field Quality Control Sample Summary Table 	21
3.1.2.3 Equipment/Sample Containers Cleaning and Decontamination Procedures	<ul style="list-style-type: none"> - Sampling SOPs 	22
3.1.2.3 Field Equipment Calibration, Maintenance, Testing, and Inspection Procedures	<ul style="list-style-type: none"> - Project Sampling SOP References Table 	23
3.1.2.4 Supply Inspection and Acceptance Procedures	<ul style="list-style-type: none"> - Field Equipment Calibration, Maintenance, Testing, and Inspection Table 	24
3.1.2.6 Field Documentation Procedures		
3.2 Analytical Tasks	<ul style="list-style-type: none"> - Analytical SOPs 	25
3.2.1 Analytical SOPs	<ul style="list-style-type: none"> - Analytical SOP References Table 	26
3.2.2 Analytical Instrument Calibration Procedures	<ul style="list-style-type: none"> - Analytical Instrument Calibration Table 	27
3.2.3 Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures	<ul style="list-style-type: none"> - Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table 	28
3.2.4 Analytical Supply Inspection and Acceptance Procedures		

QAPP Worksheet #2
QAPP Identifying Information
(Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Required Documents
3.3 Sample Collection Documentation, Handling, Tracking, and Custody Procedures 3.3.1 Sample Collection Documentation 3.3.2 Sample Handling and Tracking System 3.3.3 Sample Custody	- Sample Collection Documentation Handling, Tracking, and Custody SOPs - Sample Container Identification - Sample Handling Flow Diagram - Example Chain-of-Custody Form and Seal	26 27
3.4 Quality Control Samples 3.4.1 Sampling Quality Control Samples 3.4.2 Analytical Quality Control Samples	- QC Samples Table - Screening/Confirmatory Analysis Decision Tree	28
3.5 Data Management Tasks 3.5.1 Project Documentation and Records 3.5.2 Data Package Deliverables 3.5.3 Data Reporting Formats 3.5.4 Data Handling and Management 3.5.5 Data Tracking and Control	- Project Documents and Records Table - Analytical Services Table - Data Management SOPs	29 30
Assessment/Oversight		
4.1 Assessments and Response Actions 4.1.1 Planned Assessments 4.1.2 Assessment Findings and Corrective Action Responses	- Assessments and Response Actions - Planned Project Assessments Table - Audit Checklists - Assessment Findings and Corrective Action Responses Table	31 32
4.2 QA Management Reports	- QA Management Reports Table	33
4.3 Final Project Report		

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP
Revision Number: 0.0
Revision Date: 06/23/10
Page: 6 of 88

QAPP Worksheet #2
QAPP Identifying Information
(Continued)


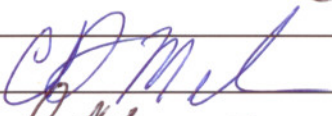
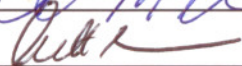


Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
Data Review		
5.1 Overview		
5.2 Data Review Steps	- Verification (Step I) Process Table	34
5.2.1 Step I: Verification	- Validation (Steps IIa and IIb) Process Table	35
5.2.2 Step II: Validation	- Validation (Steps IIa and IIb) Summary Table	36
5.2.2.1 Step IIa Validation Activities	- Usability Assessment	37
5.2.2.2 Step IIb Validation Activities		
5.2.3 Step III: Usability Assessment		
5.2.3.1 Data Limitations and Actions from Usability Assessment		
5.2.3.2 Activities		
5.3 Streamlining Data Review		
5.3.1 Data Review Steps To Be Streamlined		
5.3.2 Criteria for Streamlining Data Review		
5.3.3 Amounts and Types of Data Appropriate for Streamlining		

**QAPP Worksheet #3
Distribution List**

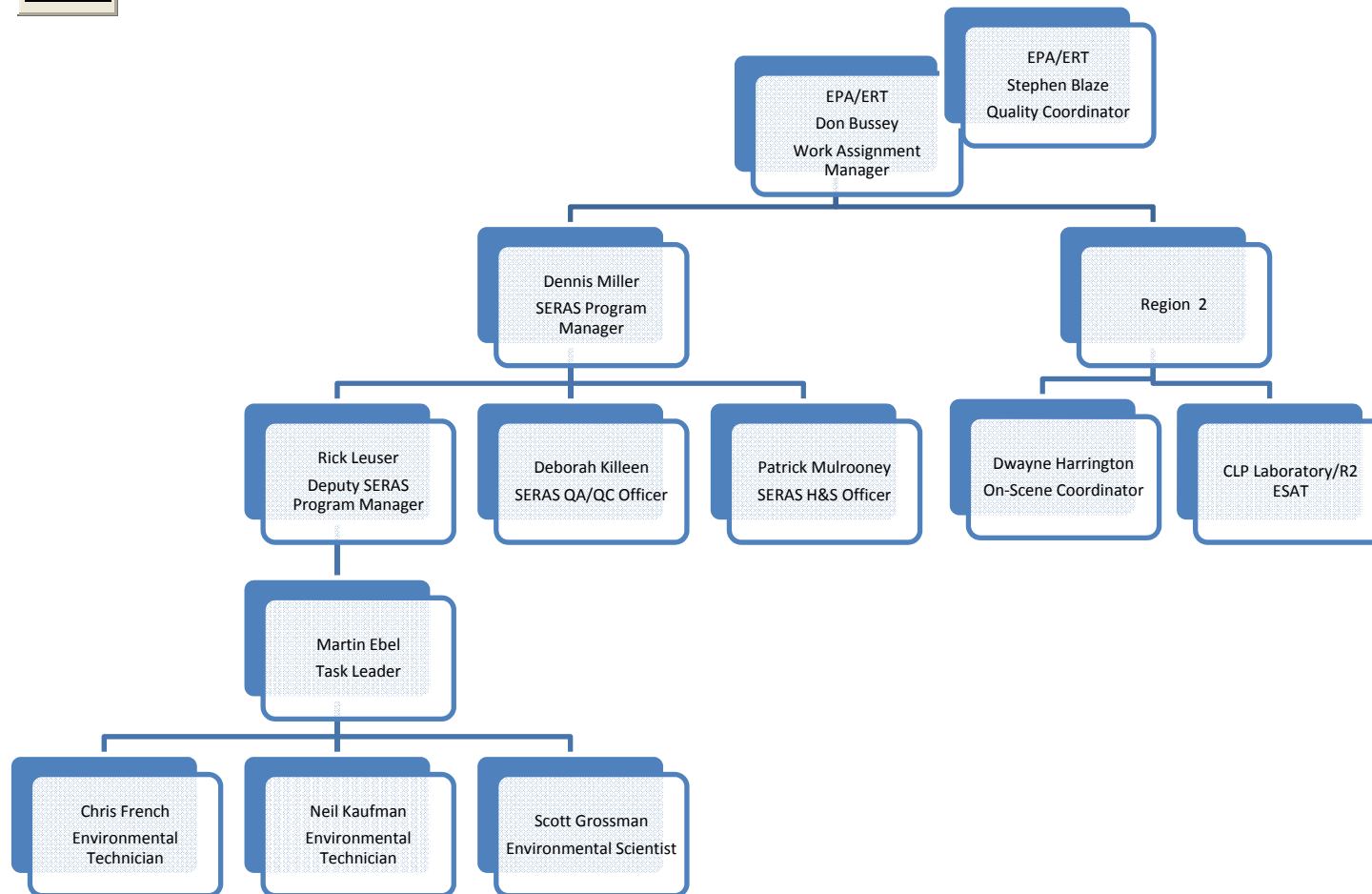
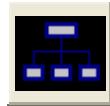
QAPP Recipients	Title	Organization	Telephone Number	Fax Number	E-mail Address	Document Control Number
Martin Ebel	Task Leader (TL)	SERAS	(732)-321-4241	(732)-494-4021	martin.t.ebel@lmco.com	SERAS-089-DQAPP-062210
Deborah Killeen	QA/QC Officer	SERAS	(732) 321-4245	(732) 494-4021	deborah.a.killeen@lmco.com	SERAS-089-DQAPP-062210
Dennis A. Miller	Program Manager	SERAS	(732) 321-4276	(732) 494-4021	dennis.a.miller@lmco.com	SERAS-089-DQAPP-062210
Donald Bussey	Work Assignment Manager (WAM)	EPA/ERT	(702) 784-8016	(702) 784-8001	bussey.don@epa.gov	SERAS-089-DQAPP-062210
Stephen Blaze	Quality Coordinator	EPA/ERT	(732) 906-6921	(732) 321-6724	blaze.stephen@epa.gov	SERAS-089-DQAPP-062210
Dwayne Harrington	On-Scene Coordinator (OSC)	EPA Region 2	(732) 906-6899	(732) 906-6182	harrington.dwayne@epa.gov	SERAS-089-DQAPP-062210

QAPP Worksheet #4
Project Personnel Sign-Off Sheet

Organization: SERAS/EPA/ERT

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Martin Ebel	Task Leader	(732)-321-4269		6/23/10
David Edgerton	Groundwater Modeler	(732)-494-4057		
Chris French	Environmental Technician	(732)-494-4040		6/23/10
Scott Grossman	Environmental Scientist	(732) 321-4230		6/23/10
Neil Kaufman	Environmental Technician	(732) 321-4254		
Don Bussey	Work Assignment Manager	(702) 784-8016		6/23/10
Dave Rosoff	Technical Support	(732) 906-6879		
Dwayne Harrington	On-Scene Coordinator	(732) 906-6899		6/23/10

QAPP Worksheet #5 Project Organizational Chart



QAPP Worksheet #6 Communication Pathways

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathways, etc.)
Approval of initial QAPP and any amendments	ERT Work Assignment Manager ERT Quality Coordinator SERAS Program Manager SERAS QA/QC Officer	Don Bussey Stephen Blaze Dennis A. Miller Deborah Killeen	(702) 784-8016 (732) 906-6921 (732) 321-4272 (732) 321-4245	SERAS internal peer review, followed by ERT approval, implementation of changes effective only with approved QAPP or QAPP Change Form.
Nonconformance and Corrective Action	SERAS Task Leader ERT Work Assignment Manager SERAS QA/QC Officer	Martin Ebel Don Bussey Deborah Killeen	(732)-321-4241 (702) 784-8016 (732) 321-4245	Use of the Work Assignment Field Change Form for field issues.
Posting of Deliverables to the ERT IMS website	SERAS Task Leader SERAS QA/QC Officer SERAS Deputy Program Manager SERAS Administrative Support	Martin Ebel Deborah Killeen Richard Leuser Eileen Ciambotti	(732)-321-4241 (732) 321-4245 (732) 494-4060 (732) 321-4255	As per work assignment, posting of deliverables to ERT-Information Management System (IMS) website constitutes delivery to the Work Assignment Manager.
Work Assignment	SERAS Program Manager	Dennis A. Miller	(732) 321-4216	Describes scope of work to SERAS personnel from the ERT Work Assignment Manager.
Health and Safety On-Site Meeting	SERAS Task Leader	Martin Ebel	(732)-321-4269	Describe potential site hazards, required personal protective equipments, and access to local emergency services.

QAPP Worksheet #7
Personnel Responsibilities and Qualification Table

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Martin Ebel	Task Leader	SERAS	Project Supervision, Reporting, Document preparation, Equipment maintenance	Minimum B.S. degree plus 14 years of related experience//Lockheed Martin Employee Files
Don Bussey	Work Assignment Manager	ERT	Technical Direction	EPA job-related qualifications/EPA Files
Stephen Blaze	Quality Coordinator	ERT	QA Oversight	EPA job-related qualifications/EPA Files
Chris French	Environmental Technician	SERAS	Soil and groundwater sampling, Geo Probe Operation	Environmental sampling experience/Lockheed Martin Employee Files
David Edgerton	Groundwater Modeler	SERAS	Peer review	Minimum B.S. degree plus 14 years of related experience/Lockheed Martin Employee Files
Deborah Killeen	QA/QC Officer	SERAS	QA Oversight/Deliverable Review	Minimum B.S. degree plus 14 years of related experience/Lockheed Martin Employee Files
Scott Grossman	Environmental Engineer/Scientist	SERAS	Sampling Support	Minimum B.S. degree plus 8 years of related experience/Lockheed Martin Employee Files
Neil Kaufman	Environmental Technician	SERAS	Soil and Groundwater Sampling	Environmental sampling experience/Lockheed Martin Employee Files

QAPP Worksheet #8
Special Personnel Training Requirements Table

Project Function	Specialized Training – Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates
Project Oversight	Health and Safety 8-hour Refresher	REAC/SERAS	10/2009	Martin Ebel	Task Leader/SERAS	Health & Safety Files
Sampling Operations	Health and Safety 8-hour Refresher	REAC/SERAS	11/2009	Chris French	Environmental Technician/SERAS	Health & Safety Files
QA Oversight	Uniform Federal Policy for Quality Assurance Project Plans	Advanced Systems	January 2006	Deborah Killeen	QA/QC Officer/SERAS	Quality Files
Sampling Operations	Health and Safety 8-hour Refresher	REAC/SERAS	07/2009	Neil Kaufman	Environmental Technician/SERAS	Health & Safety Files
Sampling Operations	Health and Safety 8-hour Refresher	REAC/SERAS	11/2009	Scott Grossman	Environmental Engineer/Scientist/SERAS	Health & Safety Files

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP

Revision Number: 0.0

Revision Date: 06/23/10

Page: 13 of 88

QAPP Worksheet #9
Project Scoping Session Participants Sheet

Project Name: Projected Date(s) of Sampling: Project Manager:				Site Name: Site Location:	
Date of Session:					
Scoping Session Purpose:					
Name	Title	Affiliation	Phone #	E-mail Address	Project Role

Comments/Decisions:

Action Items:

Consensus Decisions:

QAPP Worksheet #10
Problem Definition

The problem to be addressed by the project: The Riverside Avenue site is a former paint manufacturing facility that has numerous above ground and underground storage tanks. A limited Phase 2 assessment will be conducted to assess whether releases from the former operations or from the tanks have or are impacting site soil or groundwater. Soil borings/piezometers will be installed and soil and groundwater samples will be collected for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals and cyanide.
The environmental questions being asked: Do contaminants impacting the site have a potential of migrating into the Passaic River?
Observations from any site reconnaissance reports: NA.
A synopsis of secondary data or information from site reports: Draft Site Investigation Report for Brick City Development Corporation, PMK Group October 2009. Contaminants were identified in site soil and groundwater.
The possible classes of contaminants and the affected matrices: VOC, SVOC, metals; groundwater, soil
The rationale for inclusion of chemical and nonchemical analyses: Known contamination
Information concerning various environmental indicators: Environmental indicators obscured by land use
Project decision conditions ("If...", then..." statements): If soil and groundwater concentrations exceed the NJDEP cleanup standards listed in Worksheet 15 as guidance, then EPA Region 2 may evaluate the removal options for the site.

QAPP Worksheet #11
Project Quality Objectives /Systematic Planning Process Statements

Who will use the data? EPA Region 2 and ERT
What will the data be used for? Analysis of soil and groundwater samples will be used to determine the degree of contamination on the site and the potential of impacting the Passaic River.
What type of data are needed? (target analytes, analytical groups, field screening, on-site analytical or off-site laboratory techniques, sampling techniques) Laboratory data for VOCs, SVOCs, metals and cyanide from samples collected from groundwater and subsurface soil using Contract Laboratory Program (CLP) Statement of Work (SOW).
How “good” do the data need to be in order to support the environmental decision? Definitive data are required for the soil and groundwater samples. Worksheet #12 and #28 indicate the measurement performance criteria that are needed for the quality indicators. Worksheet #20 outlines the field quality control (QC) sample requirements.
How much data are needed? (number of samples for each analytical group, matrix, and concentration) Ten groundwater samples, 20 soil samples from ten borings (2 soil samples per boring) will be collected.
Where, when, and how should the data be collected/generated? Groundwater and soil samples will be collected the week of 6/21/10 using methods consistent with direct-push boring techniques on the site.
Who will collect and generate the data? SERAS field personnel and CLP laboratory personnel
How will the data be reported? Validated data will be reported in a final analytical report and in a Scribe file. Analytical result from the samples will plotted on a map of the site. A final trip report will be prepared in accordance with SERAS SOP #4017, <i>Preparation of Trip Reports</i> . The final trip report will be the final deliverable to the EPA/ERT WAM. Data will be disseminated to SERAS by the WAM.
How will the data be archived? Analytical data will be retained by the CLP Laboratory. Laboratory data will be imported into a Scribe database and posted to the ERT-IMS website. Hard copy and electronic result files will be forwarded to SERAS personnel through the WAM. Hard copies of all deliverables will be stored in SERAS Central Files. Electronic copies will be stored on SERAS Local Area Network (LAN). Data will be archived by SERAS in accordance with AP #34, <i>Archiving Electronic Files</i> .

**QAPP Worksheet #12-1
Measurement Performance Criteria Table**

Matrix	Aqueous				
Analytical Group	TCL Volatile Organics				
Concentration Level	Low/Medium (ug/L)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2007	SOM01.2	Precision (field)	±20% RPD	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Field Blank Trip Blank	S & A
		Precision (laboratory)	List compound specific RPD	MS/MSD**	A
		Accuracy (laboratory)	List compound specific %R	***DMCs; MS/MSD**	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. 33/Low/Medium VOA - Blank Type Criteria Table

****Optional** MS/MSD – Reference CLP SOM01.2, Exhibit D, Table 6 for Criteria

***Deuterated Monitoring Compounds (DMCs) – Reference CLP SOM01.2, Exhibit D, Table 5 for Criteria

**QAPP Worksheet #12-2
Measurement Performance Criteria Table**

Matrix	Aqueous				
Analytical Group	TCL Semivolatiles				
Concentration Level	Low/Medium (ug/L)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2007	SOM01.2	Precision (field)	±20% RPD	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Field Blank	S & A
		Precision (laboratory)	List compound specific RPD	MS/MSD**	A
		Accuracy (laboratory)	List compound specific %R	***DMCs; MS/MSD**	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. 35/Low/Medium Semivolatile - Blank Type Criteria Table

****Optional** MS/MSD – Reference CLP SOM01.2, Exhibit D, Table 6 for Criteria

***Deuterated Monitoring Compounds (DMCs) – Reference CLP SOM01.2, Exhibit D, Table 5 for Criteria

**QAPP Worksheet #12-3
Measurement Performance Criteria Table**

Matrix	Soil				
Analytical Group	TCL Volatiles				
Concentration Level	Low/Medium (ug/kg)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2012	SOM01.2	Precision (field)	±35% RPD	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Rinsate Blank	S & A
		Precision (laboratory)	List compound specific RPD	MS/MSD**	A
		Accuracy (laboratory)	List compound specific %R	***DMCs; MS/MSD**	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. 34/Trace VOA Trace VOA - Blank Type Criteria Table

****Optional** MS/MSD – Reference CLP SOM01.2, Exhibit D, Table 6 for Criteria

***Deuterated Monitoring Compounds (DMCs) – Reference CLP SOM01.2, Exhibit D, Table 5 for Criteria

**QAPP Worksheet #12-4
Measurement Performance Criteria Table**

Matrix	Soil				
Analytical Group	TCL Semivolatiles				
Concentration Level	Low/Medium (ug/kg)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2012	SOM01.2	Precision (field)	±35% RPD	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Rinsate Blank	S & A
		Precision (laboratory)	List compound specific RPD	MS/MSD**	A
		Accuracy (laboratory)	List compound specific %R	***DMCs; MS/MSD**	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. 34/Trace VOA Trace VOA - Blank Type Criteria Table

****Optional** MS/MSD – Reference CLP SOM01.2, Exhibit D, Table 6 for Criteria

***Deuterated Monitoring Compounds (DMCs) – Reference CLP SOM01.2, Exhibit D, Table 5 for Criteria

**QAPP Worksheet #12-5
Measurement Performance Criteria Table**

Matrix	Aqueous				
Analytical Group	TAL Metals				
Concentration Level	ICP-AES (ug/L)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2007	ILM05.4	Precision (field)	± 20% RPD*	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Field Blank	S & A
		Precision (laboratory)	≤ 20% RPD*	Duplicate Sample **	A
		Accuracy (laboratory)	75–125%; 80–120 %	*** Matrix Spike; LCSW****	A A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP - (include absolute difference criteria)

**Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for Duplicate Sample Criteria - (include absolute difference criteria)

***Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for Spike Sample Criteria

****Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for aqueous Laboratory Control Sample (LCSW) Criteria w/exception of Ag and Sb

**QAPP Worksheet #12-6
Measurement Performance Criteria Table**

Matrix	Aqueous				
Analytical Group	TAL –Total Mercury				
Concentration Level	Cold Vapor Atomic Absorption (CVAA)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2007	ILM05.4	Precision (field)	±20% RPD*	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Field Blank	S & A
		Precision (laboratory)	±20% RPD*	Duplicate Sample **	A
		Accuracy (laboratory)	75–125%;	*** Matrix Spike;	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP - (include absolute difference criteria)

**Reference USEPA CLP ILM05.4, Exhibit D of ICP-MS for Duplicate Sample Criteria - - (include absolute difference criteria)

***Reference USEPA CLP ILM05.4, Exhibit D of ICP-MS for Spike Sample Criteria

QAPP Worksheet #12-7
Measurement Performance Criteria Table

Matrix	Aqueous				
Analytical Group	TAL –Total Cyanide				
Concentration Level	Spectrophotometer				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2007	ILM05.4	Precision (field)	±20% RPD*	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Field Blank	S & A
		Precision (laboratory)	±20% RPD*	Duplicate Sample **	A
		Accuracy (laboratory)	75–125%	*** Matrix Spike	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP- (include absolute difference criteria)

**Reference USEPA CLP ILM05.4, Exhibit D of ICP-MS for Duplicate Sample Criteria - (include absolute difference criteria)

***Reference USEPA CLP ILM05.4, Exhibit D of ICP-MS for Spike Sample Criteria

**QAPP Worksheet #12-8
Measurement Performance Criteria Table**

Matrix	Soil				
Analytical Group	TAL Metals				
Concentration Level	ICP-AES (mg/kg)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2012	ILM05.4	Precision (field)	$\pm 35\%$ RPD*	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Rinsate Blank	S & A
		Precision (laboratory)	$\pm 35\%$ RPD*	Duplicate Sample **	A
		Accuracy (laboratory)	75–125%	*** Matrix Spike; LCSS****	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP - (include absolute difference criteria)

**Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for Duplicate Sample Criteria

***Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for Spike Sample Criteria

****Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for solid Laboratory Control Sample (LCSS) **Note: Control Limits established by USEPA for LCSS**

QAPP Worksheet #12-9 Measurement Performance Criteria Table

Matrix	Soil				
Analytical Group	TAL –Total Mercury				
Concentration Level	Cold Vapor Atomic Absorption (CVAA)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2012	ILM05.4	Precision (field)	± 35% RPD*	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Rinsate Blank	S & A
		Precision (laboratory)	± 35% RPD*	Duplicate Sample **	A
		Accuracy (laboratory)	75–125%;	*** Matrix Spike; LCSS****	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP – (include absolute difference criteria)

**Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for Duplicate Sample Criteria

Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for Spike Sample Criteria*Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for solid Laboratory Control Sample (LCSS) **Note: Control Limits established by USEPA for LCSS**

**QAPP Worksheet #12-10
Measurement Performance Criteria Table**

Matrix	Soil				
Analytical Group	TAL –Total Cyanide				
Concentration Level	Spectrophotometer				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2007	ILM05.4	Precision (field)	±20% RPD*	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Rinsate Blank	S & A
		Precision (laboratory)	±20% RPD*	Duplicate Sample **	A
		Accuracy (laboratory)	75–125% Within limits established by EPA	*** Matrix Spike LCSS	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP- (include absolute difference criteria)

**Reference USEPA CLP ILM05.4, Exhibit D of ICP-MS for Duplicate Sample Criteria - (include absolute difference criteria)

Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for Spike Sample Criteria*Reference USEPA CLP ILM05.4, Exhibit D of CN for solid Laboratory Control Sample (LCSS) **Note: Control Limits established by USEPA for LCSS**

QAPP Worksheet #13
Secondary Data Criteria and Limitations Table

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Org., Data Types, Data Generation/ Collection Dates)	How Data Will Be Used	Limitations on Data Use
Site Investigation	Birdsall Services Group Inc./ PMK Group, Inc.Draft Site Investigation 1700-1712 and 1702-1716 McCarter Highway October 2009	Birdsall Services Group Inc./ PMK Group, Inc. Laboratory analysis. Historical records, Geophysical survey	Used for site background information	More sampling needed to fill data gaps.

QAPP Worksheet #14 **Summary of Project Tasks**

Sampling Tasks: Groundwater will be sampled from temporary piezometers in accordance with SERAS SOP #2007, <i>Groundwater Well Sampling</i> . Soil samples will be collected from borings advanced with direct-push methods in accordance with SERAS SOP #2012, <i>Soil Sampling</i> .
Analysis Tasks: Groundwater and soil samples will be analyzed by a CLP laboratory for VOCs and SVOCs using SOM01.2 and for metals, mercury and cyanide using ILM05.4
Quality Control Tasks: Field QC samples are defined in Worksheet #20. Analytical QC requirements are defined in Worksheet #28. QA/QC samples will be collected in accordance with SERAS SOP #2005, <i>Quality Assurance/Quality Control Samples</i> .
Secondary Data: Used for site background information
Data Management Tasks: All sampling locations will be identified by a field assigned number. Field sampling data will be recorded on field data sheets or in field logbooks. All groundwater and soil samples will be delivered under chain of custody (COC) to a CLP Laboratory. Laboratory procedures will be reviewed and the data verified for the appropriate quality assurance objectives. All deliverables will be generated in accordance to the appropriate SERAS SOP and posted to the ERT- Information Management System (IMS) website upon completion. Posting to the ERT-IMS site will be considered as completion of the deliverable.
Documentation and Records: All documentation will be recorded in accordance with SERAS SOP #4001, <i>Logbook Documentation</i> and SOP #2002, <i>Sample Documentation</i> . The trip report will provide a description of the project; field and laboratory methodologies and results, and will be prepared in accordance with SERAS SOP #4017, <i>Preparation of Trip Reports</i> . Documents and records that may be generated during this project include: WP, QAPP, HASP, Field and Laboratory Logbooks, Site Map, Sample Labels, COC Records, Custody Seals, Projected Work Assignments (PWA), Data Review Records, Data Reduction Records, Data Validation Records, Instrument Printouts, Analytical Results, Scribe Database, Trip Report, and Field Change Forms.
Assessment/Audit Tasks: No performance audit of field operations is anticipated for this project. The tasks associated with this QAPP are assessed using peer reviews and management system reviews. Peer review enables the field team to identify and correct reporting errors before reports are submitted. Management system reviews establish compliance with prevailing management structure, policies and procedures, and ensures that the required data are obtained.
Data Review Tasks: Analytical data deliverables for CLP laboratories will be in accordance with the U.S. EPA CLP SOW for <i>Organic Analysis Multi-Media, Multi-Concentration [SOM0 1.2]</i> , and U.S. EPA CLP SOW for <i>Multi-Media, Multi-Concentration Inorganic Analysis [ILM0 5.4]</i> . Organic data will be validated in accordance with SOP Number HW-33/ <i>Data Validation SOP for Organic Analysis of Low/Medium Concentration of VOCs under SOM01.2</i> and SOP Number HW-35/ <i>Data Validation SOP for Organic Analysis of Low/Medium Concentration of SVOCs under SOM01.1, Revision 1</i> . The inorganic data will be validated according to SOP Number HW-2 <i>Validation of Metals for the Contract Laboratory Program (CLP) based on SOW ILM05.3 (SOP Revision 13)</i> . All SERAS project deliverables will receive an internal peer review prior to release, per guidelines established in the SERAS AP #22, <i>Peer Review of SERAS Deliverables</i> .

QAPP Worksheet #15-1 Reference Limits and Evaluation Table

Matrix: Soil

Analytical Group: Target Compound List Volatile Organic Compounds - Continued

Concentration Level: Low and Medium

Analyte	CAS Number	NJDEP Soil Cleanup Criteria (mg/kg)*		Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 (Low) Quantitation Limits (mg/kg)	Analytical Method – SOM01.2 (Medium) Quantitation Limits (mg/kg)
		Non-Residential	Impact to GW			
Dichlorodifluoromethane	75-71-8	NS	NS	0.005	0.005	0.25
Chloromethane	74-87-3	1000	10	0.005	0.005	0.25
Vinyl Chloride	75-01-4	7.0	10	0.005	0.005	0.25
Bromomethane	74-83-9	1000	1.0	0.005	0.005	0.25
Chloroethane	75-00-3	NS	NS	0.005	0.005	0.25
Trichlorofluoromethane	75-69-4	NS	NS	0.005	0.005	0.25
1,1-Dichloroethene	75-35-4	150	10	0.005	0.005	0.25
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NS	NS	0.005	0.005	0.25
Acetone	67-64-1	1000	100	0.01	0.01	0.5
Carbon Disulfide	75-15-0	NS	NS	0.005	0.005	0.25
Methyl Acetate	79-20-9	NS	NS	0.005	0.005	0.25
Methylene Chloride	75-09-2	210	1.0	0.005	0.005	0.25
trans-1,2-Dichloroethene	156-60-5	1000	50	0.005	0.005	0.25
Methyl tert-Butyl Ether	1634-04-4	NS	NS	0.005	0.005	0.25
1,1-Dichloroethane	75-34-3	1000	10	0.005	0.005	0.25
cis-1,2-Dichloroethene	156-59-2	1000	1.0	0.005	0.005	0.25
2-Butanone	78-93-3	1000	50	0.01	0.01	0.5
Chloroform	67-66-3	28	1.0	0.005	0.005	0.25
1,1,1-Trichloroethane	71-55-6	1000	50	0.005	0.005	0.25
Cyclohexane	110-82-7	NS	NS	0.005	0.005	0.25
Carbon Tetrachloride	56-23-5	4.0	1.0	0.005	0.005	0.25
Benzene	71-43-2	13	1.0	0.005	0.005	0.25
1,2-Dichloroethane	107-06-2	24	1.0	0.005	0.005	0.25
Trichloroethene	79-01-6	54	1.0	0.005	0.005	0.25
Methylcyclohexane	108-87-2	NS	NS	0.005	0.005	0.25
1,2-Dichloropropane	78-87-5	43	NS	0.005	0.005	0.25
Bromodichloromethane	75-27-4	46	1.0	0.005	0.005	0.25
cis-1,3-Dichloropropene	10061-01-5	5.0	1.0	0.005	0.005	0.25
4-Methyl-2-Pentanone	108-10-1	1000	50	0.01	0.01	0.5

For detailed references, see Footnotes below.

QAPP Worksheet #15-1 Reference Limits and Evaluation Table

Matrix: Soil

Analytical Group: Target Compound List Volatile Organic Compounds - Continued

Concentration Level: Low and Medium

Analyte	CAS Number	NJDEP Soil Cleanup Criteria (mg/kg)*		Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 (Low) Quantitation Limits (mg/kg)	Analytical Method – SOM01.2 (Medium) Quantitation Limits (mg/kg)
		Non-Residential	Impact to GW			
Toluene	108-88-3	1000	500	0.005	0.005	0.25
trans-1,3-Dichloropropene	10061-02-6	5.0	1.0	0.005	0.005	0.25
1,1,2-Trichloroethane	79-00-5	420	1.0	0.005	0.005	0.25
Tetrachloroethene	127-18-4	6.0	1.0	0.005	0.005	0.25
2-Hexanone	591-78-6	NS	NS	0.01	0.01	0.5
Dibromochloromethane	124-48-1	1000	1.0	0.005	0.005	0.25
1,2-Dibromoethane	106-93-4	NS	NS	0.005	0.005	0.25
Chlorobenzene	108-90-7	680	1.0	0.005	0.005	0.25
Ethylbenzene	100-41-4	1000	100	0.005	0.005	0.25
Xylenes (total)	1330-20-7	1000	67	0.005	0.005	0.25
Styrene	100-42-5	97	100	0.005	0.005	0.25
Bromoform	75-25-2	370	1.0	0.005	0.005	0.25
Isopropylbenzene	98-82-8	NS	NS	0.005	0.005	0.25
1,1,2,2-Tetrachloroethane	79-34-5	70	1.0	0.005	0.005	0.25
1,3-Dichlorobenzene	541-73-1	10,000	100	0.005	0.005	0.25
1,4-Dichlorobenzene	106-46-7	10,000	100	0.005	0.005	0.25
1,2-Dichlorobenzene	95-50-1	10,000	50	0.005	0.005	0.25
1,2-Dibromo-3-chloropropane	96-12-8	NS	NS	0.005	0.005	0.25
1,2,4-Trichlorobenzene	120-82-1	1200	100	0.005	0.005	0.25

*New Jersey Department of Environmental Protection (NJDEP) - Direct Contact Soil Cleanup Criteria, May 12, 1999. [Use the most recent version].

QAPP Worksheet #15-2

Reference Limits and Evaluation Table

Matrix:

Analytical Group:

Concentration Level:

Analyte	CAS Number	NJDEP Soil Cleanup Criteria (mg/kg)*		Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 (Low) Quantitation Limits (mg/kg)	Analytical Method – SOM01.2 (Medium) Quantitation Limits (mg/kg)
		Non-Residential	Impact to GW			
1,1'-Biphenyl	92-52-4			0.17	0.17	5.0
2,2'-oxybis(1-Chloropropane)	108-60-1			0.17	0.17	5.0
2,4,5-Trichlorophenol	95-95-4	10,000	50	0.17	0.17	5.0
2,4,6-Trichlorophenol	88-06-2	270	10	0.17	0.17	5.0
2,4-Dichlorophenol	120-83-2	3100	10	0.17	0.17	5.0
2,4-Dimethylphenol	105-67-9	10,000	10	0.17	0.17	5.0
2,4-Dinitrophenol	51-28-5	2100	10	0.33	0.33	10
2,4-Dinitrotoluene	121-14-2	4	10	0.17	0.17	5.0
2,6-Dinitrotoluene	606-20-2	4	10	0.17	0.17	5.0
2-Chloronaphthalene	91-58-7			0.17	0.17	5.0
2-Chlorophenol	95-57-8	5200	10	0.17	0.17	5.0
2-Methylnaphthalene	91-57-6			0.17	0.17	5.0
2-Methylphenol (o-cresol)	95-48-7	10000		0.17	0.17	5.0
2-Nitroaniline	88-74-4			0.33	0.33	10
2-Nitrophenol	88-75-5			0.17	0.17	5.0
3,3'-Dichlorobenzidine	91-94-1	6	100	0.17	0.17	5.0
3-Nitroaniline	99-09-2			0.33	0.33	10
4,6-Dinitro-2-methylphenol	534-52-1			0.33	0.33	10
4-Bromophenyl-phenylether	101-55-3			0.17	0.17	5.0
4-Chloro-3-methylphenol	59-50-7	10,000	100	0.17	0.17	5.0
4-Chloroaniline	106-47-8	4200		0.17	0.17	5.0
4-Chlorophenyl-phenyl ether	7005-72-3			0.17	0.17	5.0
4-Methylphenol (p-cresol)	106-44-5	10,000		0.17	0.17	5.0
4-Nitroaniline	100-01-6			0.33	0.33	10
4-Nitrophenol	100-02-7			0.33	0.33	10
Acenaphthene	83-32-9	10,000	100	0.17	0.17	5.0
Acenaphthylene	208-96-8			0.17	0.17	5.0
Acetophenone	98-86-2			0.17	0.17	5.0
Anthracene	120-12-7	10,000	100	0.17	0.17	5.0

For detailed references, see Footnotes below.

QAPP Worksheet #15-2

Reference Limits and Evaluation Table

Matrix:

Analytical Group:

Concentration Level:

Analyte	CAS Number	NJDEP Soil Cleanup Criteria (mg/kg)*		Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 (Low) Quantitation Limits (mg/kg)	Analytical Method – SOM01.2 (Medium) Quantitation Limits (mg/kg)
		Non-Residential	Impact to GW			
Atrazine	1912-24-9	NS	NS	0.17	0.17	5.0
Benzaldehyde	100-52-7	NS	NS	0.17	0.17	5.0
Benzo(a)anthracene	56-55-3	4	500	0.17	0.17	5.0
Benzo(a)pyrene	50-32-8	0.66	100	0.17	0.17	5.0
Benzo(b)fluoranthene	205-99-2	4	50	0.17	0.17	5.0
Benzo(g,h,i)perylene	191-24-2	NS	NS	0.17	0.17	5.0
Benzo(k)fluoranthene	207-08-9	4	500	0.17	0.17	5.0
Bis(2-Chloroethoxy)methane	111-91-1	NS	NS	0.17	0.17	5.0
Bis-(2-Chloroethyl) ether	111-44-4	3	10	0.17	0.17	5.0
bis(2-Ethylhexyl)phthalate	117-81-7	210	100	0.17	0.17	5.0
Butylbenzylphthalate	85-68-7	10,000	100	0.17	0.17	5.0
Caprolactam	105-60-2	NS	NS	0.17	0.17	5.0
Carbazole	86-74-8	NS	NS	0.17	0.17	5.0
Chrysene	218-01-9	40	500	0.17	0.17	5.0
Dibenzo(a,h)anthracene	53-70-3	0.66	100	0.17	0.17	5.0
Dibenzofuran	132-64-9	NS	NS	0.17	0.17	5.0
Diethylphthalate	84-66-2	10,000	50	0.17	0.17	5.0
Dimethylphthalate	131-11-3	10,000	50	0.17	0.17	5.0
Di-n-butylphthalate	84-74-2	10,000	100	0.17	0.17	5.0
Di-n-octylphthalate	117-84-0	10,000	100	0.17	0.17	5.0
Fluoranthene	206-44-0	10,000	100	0.17	0.17	5.0
Fluorene	86-73-7	10,000	100	0.17	0.17	5.0
Hexachlorobenzene	118-74-1	2	100	0.17	0.17	5.0
Hexachlorobutadiene	87-68-3	21	100	0.17	0.17	5.0
Hexachlorocyclopentadiene	77-47-4	7300	100	0.17	0.17	5.0
Hexachloroethane	67-72-1	100	100	0.17	0.17	5.0
Indeno(1,2,3-cd)pyrene	193-39-5	4	500	0.17	0.17	5.0

For detailed references, see Footnotes below.

QAPP Worksheet #15-2
Reference Limits and Evaluation Table

Matrix: Soil

Analytical Group: Target Compound List – Semi-Volatile Organic Compounds - Continued

Concentration Level: Low and Medium

Analyte	CAS Number	NJDEP Soil Cleanup Criteria (mg/kg)*		Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 (Low) Quantitation Limits (mg/kg)	Analytical Method – SOM01.2 (Medium) Quantitation Limits (mg/kg)
		Non-Residential	Impact to GW			
Isophorone	78-59-1	10,000	50	0.17	0.17	5.0
Naphthalene	91-20-3	4200	100	0.17	0.17	5.0
Nitrobenzene	98-95-3	520	10	0.17	0.17	5.0
N-Nitrosodiphenylamine	86-30-6	600	100	0.17	0.17	5.0
N-Nitroso-di-n-propylamine	621-64-7	0.66	10	0.17	0.17	5.0
Pentachlorophenol	87-86-5	24	100	0.33	0.33	10
Phenanthrene	85-01-8	NS	NS	0.17	0.17	5.0
Phenol	108-95-2	10,000	50	0.17	0.17	5.0
Pyrene	129-00-0	10,000	100	0.17	0.17	5.0

*New Jersey Department of Environmental Protection (NJDEP) - Direct Contact Soil Cleanup Criteria, May 12, 1999. [Use the most recent version].

QAPP Worksheet #15-3
Reference Limits and Evaluation Table

Matrix: Soil

Analytical Group: Target Analyte List Inorganics (Mercury and Cyanide)

Concentration Level: Low

Analyte	CAS Number	NJDEP Soil Cleanup Criteria (mg/kg)*	Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 Quantitation Limits (mg/kg)
		Non-Residential		
Aluminum	7429-90-5		20	20
Antimony	7440-36-0	340	6	6
Arsenic	7440-38-2	20	1	1
Barium	7440-39-3	47,000	20	20
Beryllium	7440-41-7	2	0.5	0.5
Cadmium	7440-43-9	100	0.5	0.5
Calcium	7440-70-2		500	500
Chromium	7440-47-3		1	1
Cobalt	7440-48-4		5	5
Copper	7440-50-8	600	2.5	2.5
Iron	7439-89-6		10	10
Lead	7439-92-1	600	1	1
Magnesium	7439-95-4		500	500
Manganese	7439-96-5		1.5	1.5
Mercury	7439-97-6	270	0.1	0.1
Nickel	7440-02-0	2400	4	4
Potassium	7440-09-7		500	500
Selenium	7782-49-2	3100	3.5	3.5
Silver	7440-22-4	4100	1	1
Sodium	7440-23-5		500	500
Thallium	7440-28-0	2	2.5	2.5
Vanadium	7440-62-2	7100	5	5
Zinc	7440-66-6	1500	6	6
Cyanide	57-12-5	21,000	2.5	2.5

*New Jersey Department of Environmental Protection (NJDEP) - Direct Contact Soil Cleanup Criteria, May 12, 1999. [Use the most recent version].

QAPP Worksheet #15-4
Reference Limits and Evaluation Table

Matrix: Groundwater

Analytical Group: Target Compound List Volatile Organic Compounds – Continued

Concentration Level: Low

Analyte	CAS Number	NJAC Groundwater Quality Standards* (ug/L)	Project Quantitation Limit (ug/L)	Analytical Method – SOM01.2 Low Quantitation Limits (ug/L)
Dichlorodifluoromethane	75-71-8	1000	5	5
Chloromethane (Methyl Chloride)	74-87-3		5	5
Vinyl Chloride	75-01-4	1	5	5
Bromomethane	74-83-9	10	5	5
Chloroethane	75-00-3		5	5
Trichlorofluoromethane	75-69-4	2000	5	5
1,1-Dichloroethene	75-35-4	1	5	5
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		5	5
Acetone (2-Propanone)	67-64-1	6000	10	10
Carbon Disulfide	75-15-0	700	5	5
Methyl Acetate	79-20-9	7000	5	5
Methylene Chloride	75-09-2	3.0	5	5
trans-1,2-Dichloroethene	156-60-5	100	5	5
Methyl tert-Butyl Ether	1634-04-4	70	5	5
1,1-Dichloroethane	75-34-3	50	5	5
cis-1,2-Dichloroethene	156-59-2	70	5	5
2-Butanone (Methyl Ethyl Ketone)	78-93-3	300	10	10
Bromochloromethane	74-97-5		5	5
Chloroform	67-66-3	70	5	5
1,1,1-Trichloroethane	71-55-6	30	5	5
Cyclohexane	110-82-7		5	5
Carbon Tetrachloride	56-23-5	1	5	5
Benzene	71-43-2	1	5	5
1,2-Dichloroethane	107-06-2	2	5	5
Trichloroethene	79-01-6	1	5	5
Methylcyclohexane	108-87-2		5	5
1,2-Dichloropropane	78-87-5	1	5	5
Bromodichloromethane	75-27-4	1	5	5
cis-1,3-Dichloropropene	10061-01-5	1	5	5

QAPP Worksheet #15-4

Reference Limits and Evaluation Table

Matrix: Groundwater

Analytical Group: Target Compound List Volatile Organic Compounds – Continued

Concentration Level: Low

Analyte	CAS Number	NJAC Groundwater Quality Standards* (ug/L)	Project Quantitation Limit (ug/L)	Analytical Method – SOM01.2 Low Quantitation Limits (ug/L)
4-Methyl-2-Pentanone	108-10-1	NS	10	10
Toluene	108-88-3	600	5	5
trans-1,3-Dichloropropene	10061-02-6	1	5	5
1,1,2-Trichloroethane	79-00-5	3	5	5
Tetrachloroethene	127-18-4	1	5	5
2-Hexanone	591-78-6	NS	10	10
Dibromochloromethane	124-48-1	1	5	5
1,2-Dibromoethane	106-93-4	NS	5	5
Chlorobenzene	108-90-7	50	5	5
Ethylbenzene	100-41-4	700	5	5
Xylenes (total)	1330-20-7	1000	5	5
Styrene	100-42-5	100	5	5
Bromoform	75-25-2	4	5	5
Isopropylbenzene	98-82-8	NS	5	5
1,1,2,2-Tetrachloroethane	79-34-5	1	5	5
1,3-Dichlorobenzene	541-73-1	600	5	5
1,4-Dichlorobenzene	106-46-7	75	5	5
1,2-Dichlorobenzene	95-50-1	600	5	5
1,2-Dibromo-3-chloropropane	96-12-8	0.02	5	5
1,2,4-Trichlorobenzene	120-82-1	9	5	5
1,2,3-Trichlorobenzene	87-61-6	NS	5	5

*NJDEP N.J.A.C. 7:9C, Ground Water Quality Standards (GWQS) dated November 7, 2005. [Use the most recent version]

QAPP Worksheet #15-5
Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: Target Compound List - Semi-Volatile Organic Compounds
Concentration Level: Low

Analyte	CAS Number	NJAC Groundwater Quality Standards* (ug/L)	Project Quantitation Limit (ug/L)	Analytical Method – SOM01.2 Quantitation Limits (ug/L)
1,1'-Biphenyl	92-52-4	400	5	5
1,2,4,5 Tetrachlorobenzene	95-94-3	NS	5	5
2,2'-oxybis(1-Chloropropane)	108-60-1	NS	5	5
2,4,5-Trichlorophenol	95-95-4	700	5	5
2,4,6-Trichlorophenol	88-06-2	20	5	5
2,4-Dichlorophenol	120-83-2	20	5	5
2,4-Dimethylphenol	105-67-9	100	5	5
2,4-Dinitrophenol	51-28-5	40	10	10
2,4-Dinitrotoluene	121-14-2	10	5	5
2,6-Dinitrotoluene	606-20-2	10	5	5
2-Chloronaphthalene	91-58-7	6000	5	5
2-Chlorophenol	95-57-8	40	5	5
2-Methylnaphthalene	91-57-6	NS	5	5
2-Methylphenol	95-48-7	NS	5	5
2-Nitroaniline	88-74-4	NS	10	10
2-Nitrophenol	88-75-5	NS	5	5
3,3'-Dichlorobenzidine	91-94-1	30	5	5
3-Nitroaniline	99-09-2	NS	10	10
4,6-Dinitro-2-methylphenol	534-52-1	NS	10	10
4-Bromophenyl-phenylether	101-55-3	NS	5	5
4-Chloro-3-methylphenol	59-50-7	NS	5	5
4-Chloroaniline	106-47-8	30	5	5
4-Chlorophenyl-phenyl ether	7005-72-3	NS	5	5
4-Methylphenol	106-44-5	NS	5	5
4-Nitroaniline	100-01-6	NS	10	10
4-Nitrophenol	100-02-7	NS	10	10
Acenaphthene	83-32-9	400	5	5
Acenaphthylene	208-96-8	NS	5	5
Acetophenone	98-86-2	700	5	5
Anthracene	120-12-7	2000	5	5
Atrazine	1912-24-9	3	5	5

QAPP Worksheet #15 Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: Target Compound List - Semi-Volatile Organic Compounds - Continued
Concentration Level: Low

Analyte	CAS Number	NJAC Groundwater Quality Standards (ug/L)*	Project Quantitation Limit (ug/L)	Analytical Method – SOM01.2 Quantitation Limits (ug/L)
Benzaldehyde	100-52-7	NS	5	5
Benzo(a)anthracene	56-55-3	0.1	5	5
Benzo(a)pyrene	50-32-8	0.1	5	5
Benzo(b)fluoranthene	205-99-2	0.2	5	5
Benzo(g,h,i)perylene	191-24-2	NS	5	5
Benzo(k)fluoranthene	207-08-9	0.5	5	5
Bis(2-Chloroethoxy)methane	111-91-1	NS	5	5
Bis-(2-Chloroethyl) ether	111-44-4	7	5	5
bis(2-Ethylhexyl)phthalate	117-81-7	3	5	5
Butylbenzylphthalate	85-68-7	100	5	5
Caprolactam	105-60-2	NS	5	5
Chrysene	218-01-9	5	5	5
Dibenzo(a,h)anthracene	53-70-3	0.3	5	5
Dibenzofuran	132-64-9	NS	5	5
Diethylphthalate	84-66-2	6000	5	5
Dimethylphthalate	131-11-3	NS	5	5
Di-n-butylphthalate	84-74-2	700	5	5
Di-n-octylphthalate	117-84-0	100	5	5
Fluoranthene	206-44-0	300	5	5
Fluorene	86-73-7	300	5	5
Hexachlorobenzene	118-74-1	0.02	5	5
Hexachlorobutadiene	87-68-3	1	5	5
Hexachlorocyclopentadiene	77-47-4	40	5	5
Hexachloroethane	67-72-1	7	5	5
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	5	5
Isophorone	78-59-1	40	5	5
Naphthalene	91-20-3	NS	5	5
Nitrobenzene	98-95-3	300	5	5
N-Nitrosodiphenylamine	86-30-6	10	5	5
N-Nitroso-di-n-propylamine	621-64-7	10	5	5
Pentachlorophenol	87-86-5	0.3	10	10
Phenanthrene	85-01-8	NS	5	5

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP

Revision Number: 0.0

Revision Date: 06/23/10

Page: 38 of 88

Worksheet #15-5
Reference Limits and Evaluation Table

Matrix: Groundwater

Analytical Group: Target Compound List - Semi-Volatile Organic Compounds - Continued

Concentration Level: Low

Phenol	108-95-2	2000	5	5
Pyrene	129-00-0	200	5	5

*NJDEP N.J.A.C. 7:9C, Ground Water Quality Standards (GWQS) dated November 7, 2005. [Use the most recent version]

QAPP Worksheet #15-6 Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: Target Compound List - Metals
Concentration Level: Low

Analyte	CAS Number	NJAC Groundwater Quality Standards (ug/L)*	Project Quantitation Limit (ug/L)	Analytical Method – ILMO5.4 ICP-AES Quantitation Limits (ug/L)
Aluminum	7429-90-5	200	200	200
Antimony	7440-36-0	6	60	60
Arsenic	7440-38-2	3	10	10
Barium	7440-39-3	6000	200	200
Beryllium	7440-41-7	1	5	5
Cadmium	7440-43-9	4	5	5
Calcium	7440-70-2	NS	5000	5000
Chromium	7440-47-3	70	10	10
Cobalt	7440-48-4	NS	50	50
Copper	7440-50-8	1300	25	25
Iron	7439-89-6	300	100	100
Lead	7439-92-1	5	10	10
Magnesium	7439-95-4	NS	5000	5000
Manganese	7439-96-5	50	15	15
Mercury	7439-97-6	2	0.2	0.2
Nickel	7440-02-0	100	40	40
Potassium	2023695	NS	5000	5000
Selenium	7782-49-2	40	35	35
Silver	7440-22-4	40	10	10
Sodium	7440-23-5	50000	5000	5000
Thallium	7440-28-0	2	25	25
Vanadium	7440-62-2	NS	50	50
Zinc	7440-66-6	2000	60	60
Cyanide	57-12-5	100	10	10

*NJDEP N.J.A.C. 7:9C, Ground Water Quality Standards (GWQS) dated November 7, 2005. [Use the most recent version]

**QAPP Worksheet #16
Project Schedule Timeline Table**

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
Document review	SERAS	May 14, 2010	August 25, 2010	No	Not applicable
Soil and groundwater sampling	SERAS	June 23, 2010	June 25, 2010	No	Not applicable
Laboratory Analysis	CLP laboratory	June 25, 2010	July 26, 2010	Yes	July 26, 2010
Trip Report	SERAS	July 26, 2010	August 26, 2010	Yes	August 26, 2010

QAPP Worksheet #17

Sampling Design and Rationale

Describe and provide a rationale for choosing the sampling approach (e.g., grid system, biased statistical approach):

The sampling is to determine whether contamination from the site is impacting the Passaic River. Samples will be collected from upgradient locations and along the river to determine what contaminants are from the site and are entering the river. Samples will also be collected immediately downgradient of potential sources on the site such as above ground and underground storage tanks. Grab samples will be collected first for VOCs in soil from the cores. The remainder of the core will be homogenized and then aliquots taken for the SVOC, metals and cyanide analyses. Grab samples will be collected for the water samples.

Describe the sampling design and rationale in terms of what matrices will be sampled, what analytical groups will be analyzed and at what concentration levels, the sampling locations (including QC, critical, and background samples), the number of samples to be taken, and the sampling frequency (including seasonal considerations) [May refer to map or Worksheet #18 for details]:

Soil and groundwater will be sampled and analyzed for VOCs SVOCs and metals at low and medium concentration levels; duplicates of both matrices and additional material will be collected for MS/MSD analysis. Trip blanks and field blanks will be collected for groundwater samples. A rinsate blank will be collected for the soil samples from the cutting shoe after it has been decontaminated and from the unused aluminum pans/spoons and gloves. Up to 20 soil samples and 10 groundwater samples (not including QC) will be collected during the week of 6/21/10. The approximate locations of the sampling are shown on Figure 1 – Soil Boring Locations.

QAPP Worksheet #18
Sampling Locations and Methods/SOP Requirements Table

Sampling Location/ID Number	Matrix	Depth (Feet)	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference¹	Rationale for Sampling Location
B1_1	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Upgradient and southwest corner of the site
B1_2	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Upgradient and southwest corner of the site
B2_1	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Upgradient and northwest corner of the site
B2_2	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Upgradient and northwest corner of the site
B3_1	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of above ground storage tanks
B3_2	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of above ground storage tanks
B4_1	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of underground storage tanks
B4_2, B4_2dup	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of underground storage tanks
B5_1	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of underground storage tanks
B5_2	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of underground storage tanks
B6_1	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of potential underground pipes

Sampling Location/ID Number	Matrix	Depth (Feet)	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference¹	Rationale for Sampling Location
B6_2	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of potential underground pipes
B7_1	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of potential underground pipes
B7_2	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of potential underground pipes
B8_1	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Along river southeast corner of the site
B8_2	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Along river southeast corner of the site
B9_1	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Along river central to the site
B9_2	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Along river central to the site
B10_1	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Along river northeast corner of the site
B10_2	Soil	To be determined	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Along river northeast corner of the site
B1_GW	groundwater	8	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Upgradient and southwest corner of the site
B2_GW	groundwater	8	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Upgradient and northwest corner of the site
B3_GW	groundwater	8	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Downgradient of above ground storage tanks

Sampling Location/ID Number	Matrix	Depth (Feet)	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference¹	Rationale for Sampling Location
B4_GW	groundwater	8	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Downgradient of underground storage tanks
B5_GW: B5_GWdup	Groundwater	12	VOC, SVOC, TAL (including CN and Hg)	Low	1 and field duplicate	2007 – Groundwater Well Sampling	Downgradient of underground storage tanks
B6_GW	Groundwater	12	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Downgradient of potential underground pipes
B7_GW	Groundwater	12	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Downgradient of potential underground pipes
B8_GW	Groundwater	12	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Along river southeast corner of the site
B9_GW	Groundwater	12	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Along river central to the site
B10_GW	Groundwater	12	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Along river northeast corner of the site

¹Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #21).

QAPP Worksheet #19
Analytical SOP Requirements Table

Matrix	No. of Samples	Analytical Group [Lab Assignment]	Concentration Level	Analytical and Preparation Method/SOP Reference	Sample Volume	Containers (number, size, and type)	Preservation Requirements	Maximum Holding Time (preparation/ analysis)
Soil	21	VOC	Low	SOM01.2	15 grams	(3) 40-mL vials with 5 g soil & stir bar	Cool to 4°C	48 hours (from time of sample collection)
	21	SVOC	Low	SOM01.2	100 grams	(1) 4 oz. glass jar w/Teflon lined cap	Cool to 4°C	14 days extract; 40 days analyze
	21	Metals	Low	ILM05.4	100 grams	(1) 4 oz. glass jar w/Teflon lined cap	Cool to 4°C	180 days (Hg-28 days) (CN 14 days)
Aqueous	11	VOC	Trace or Low	SOM01.2	120 ml	(3) 40 ml vials w/Teflon lined septum	1:1 HCl to pH<2; cool to 4°C	14 days
	11	SVOC	Low	SOM01.2	1000 ml	(2) 1L amber glass bottles w/Teflon lined cap	Cool to 4°C	7 days extract, 40 days analyze
	11	Metals	Low	ILM05.4	250 ml	(1) 1 L HDPE	HNO ₃ to pH<2; cool to 4°C	6 months (Hg-28 days) (CN 14 days)
Equipment Blanks	1	VOC	Low	SOM01.2	120 ml	(3) 40 ml vials w/Teflon lined septum	1:1 HCl to pH<2; cool to 4°C	14 days
	1	SVOC	Low	SOM01.2	1000 ml	(2) 1L amber glass bottles w/Teflon lined cap	Cool to 4°C	7 days extract, 40 days analyze
	1	Metals	Low	ILM05.4	250 ml	(1) 1 L HDPE	HNO ₃ to pH<2; cool to 4°C	6 months (Hg-28 days) (CN 14 days)

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP

Revision Number: 0.0

Revision Date: 06/23/10

Page: 46 of 88

Matrix	No. of Samples	Analytical Group [Lab Assignment]	Concentration Level	Analytical and Preparation Method/SOP Reference	Sample Volume	Containers (number, size, and type)	Preservation Requirements	Maximum Holding Time (preparation/ analysis)
Trip Blank	1 per shipment	VOC	Low	SOM01.2	120 ml	(4) 40 ml VOA vials w/Teflon lined septum	1:1 HCl to pH<2; cool to 4°C	14 days

QAPP Worksheet #20
Field Quality Control Sample Summary Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs	No. of Extra Volume Laboratory QC (e.g., MS/MSD) Samples	No. of Field/ Equipment Blanks	No. of Trip. Blanks	No of PE Samples
Soil	VOC	Low	SOM01.2	20	1	1	1	NA	NA
	SVOC	Low	SOM01.2	20	1	1	1	NA	NA
	TAL Metals CN	Low	ILM05.4	20	1 1	1 1	1 1	NA	NA
Aqueous	VOC	Low	SOM01.2	10	1	1	1	1	NA
	SVOC	Low	SOM01.2	10	1	1	1	NA	NA
	TAL Metals CN	Low	ILM05.4	10	1 1	1 1	1 1	NA	NA

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP

Revision Number: 0.0

Revision Date: 06/23/10

Page: 48 of 88

QAPP Worksheet #21
Project Sampling SOP References Table

Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Y/N)	Comments
SERAS SOP #2012	Soil Sampling	SERAS	Direct Push	N	
SERAS SOP #2007	Groundwater Well Sampling	SERAS	NA	N	

QAPP Worksheet #22
Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Field Equipment	Calibration Activity	Maintenance Activity	Testing/ Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
PID	NA	Check/replace battery	NA	Prior to day's activities; anytime anomaly suspected	+/- 5 ppm	Replace battery; replace probe	Air Team Technician	Manufacturer's manual
Ground Penetrating Radar SmartCart Noggin	Calibrate Odometer with measuring Tape	Keep batteries charged	Comparison with standardized area	Annually	Reproducible data in standardized area	Send to manufacturer for repair and calibration	Martin Ebel SERAS geophysicist	In review

QAPP Worksheet #23
Analytical SOP References Table

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work?
SOM01.2	USEPA Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Organic Analysis; October 2006	Definitive	VOC	GC/MS	CLP	No
			SVOC	GC/MS		
ILM05.4	USEPA Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Inorganic Analysis; December 2006	Definitive	Metals	ICP-AES	CLP	No
			Mercury	CVAA		
			Cyanide	Spectrophotometer		

QAPP Worksheet #24
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference¹
GC/MS	See SOM01.2	Initial calibration: upon award of the contract, whenever the laboratory takes corrective action which may change or affect the initial calibration criteria (e.g., ion source cleaning or repair, column replacement, etc.), or if the continuing calibration acceptance criteria have not been met. Continuing calibration: Once every 12 hours	Initial calibration/ Continuing calibration: relative response factor (RRF) greater than or equal to minimum acceptable response factor listed in Table 5 of procedure; %RSD must be less than or equal to value listed in Table 5 of procedure	Initial calibration: inspect system for problems (e.g., clean ion source, change the column, service the purge and trap device), correct problem, re-calibrate. Continuing calibration: inspect system, recalibrate the instrument, reanalyze samples.	EPA CLP RAS Laboratory GC/MS Technician	SOM01.2
ICP-AES CVAA	See ILM05.4; as per instrument manufacturer's recommended procedures	ICP-AES Initial calibration: daily or once every 24 hours and each time the instrument is set up. ICP-AES Continuing calibration: beginning and end of run and frequency of 10% or every 2 hours during an analysis run.	ICP-AES: As per instrument manufacturer's recommended procedures, with at least 2 standards.	ICP-AES: inspect the system, correct problem, re-calibrate, and reanalyze samples.	EPA CLP RAS Laboratory ICP-AES Technician	ILM05.4
Spectrophotometer	See ILM05.4	Daily or once every 24 hours. Blank and minimum of 3 calibration standards. One calibration standard must be at least the CRQL. ICV immediately after calibration CCV every 10 samples and at the end.	$r \geq 0.995$ ICV 85 - 115 CCV 85 - 115	Problem-corrected, instrument recalibrated, calibration verified and reanalysis of samples since last compliant CCV.	EPA CLP RAS Laboratory Wet Chemistry Technician	ILM05.4

QAPP Worksheet #25
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing/Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference¹
GC/MS	See SOM01.2; as per instrument manufacturer's recommendations	See SOM01.2; as per instrument manufacturer's recommendations	See SOM01.2; as per instrument manufacturer's recommendations	Acceptable re- calibration; see SOM01.2	Inspect the system, correct problem, re- calibrate and/or reanalyze samples.	EPA CLP RAS Laboratory GC/MS Technician	SOM01.2
ICP-AES/CVAA	As per instrument manufacturer's recommendations	As per instrument manufacturer's recommendations; check connections	As per instrument manufacturer's recommendations	Acceptable re- calibration; see ILM05.4	Inspect the system, correct problem, re- calibrate and/or reanalyze samples.	EPA CLP RAS Laboratory ICP- AES / ICP-MS Technician	ILM05.4

**QAPP Worksheet #26
Sample Handling System**

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): Martin Ebel, Neil Kaufman, Chris French/Scott Grossman/SERAS
Sample Packaging (Personnel/Organization): Martin Ebel, Chris French/Scott Grossman/SERAS
Coordination of Shipment (Personnel/Organization): Martin Ebel, Chris French/Scott Grossman/SERAS
Type of Shipment/Carrier: Federal Express, and personal delivery
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Sample Custodian, EPA CLP RAS Laboratory
Sample Custody and Storage (Personnel/Organization): Sample Custodian, EPA CLP RAS Laboratory
Sample Preparation (Personnel/Organization): NA
Sample Determinative Analysis (Personnel/Organization): Sample Technicians, EPA CLP RAS Laboratory
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): Samples to be shipped the same day as collected, and arrive at laboratory within 24 hours (1 day) of being sampled.
Sample Extract/Digestate Storage (No. of days from extraction/digestion): NA
Biological Sample Storage (No. of days from sample collection): NA
SAMPLE DISPOSAL
Personnel/Organization: Sample Technicians, EPA CLP RAS Laboratory
Number of Days from Analysis: According to CLP Laboratory protocols

QAPP Worksheet #27

Sample Custody Requirements

Sample Identification Procedures: Each sample will be labeled with the site identification code [02PC] and a sample type letter code and number that depict a specific location. Each sample will also be labeled with a CLP or Non-CLP assigned number. Depending on the type of sample, additional information such as depth, sampling round, date, etc. will be added. Examples are provided in the QAPP.

Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory): Each sample will be individually identified and labeled after collection, then sealed with custody seals and enclosed in a plastic cooler. The sample information will be recorded on chain-of-custody (COC) forms, and the samples shipped to the appropriate laboratory via overnight delivery service or courier. EPA FORMS II Lite or Scribe program will be used for field documentation, depending on the laboratory. Refer to the U.S. EPA OSWER 9240.0-44, EPA 540-R-07-06 *Contract Laboratory Program Guidance for Field Samplers*, dated July 2007

Laboratory Sample Custody Procedures (receipt of samples, archiving, and disposal): A sample custodian at the laboratory will accept custody of the shipped samples, and check them for discrepancies, proper preservation, integrity, etc. If noted, issues will be forwarded to the laboratory manager for corrective action. The sample custodian will relinquish custody to the appropriate department for analysis. At this time, no samples will be archived at the laboratory. Disposal of the samples will occur only after analyses and QA/QC checks are completed.

QAPP Worksheet #28-1 QC Samples Table

Matrix	Soil
Analytical Group	VOC
Concentration Level	Low/Medium (mg/kg)
Sampling SOP(s)	SERAS SOP #2012
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	20

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Method Blank	1 every 12 hours	No analyte > CRQL*		Suspend analysis unit source recertified	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	No analyte > CRQL*	
Matrix Spike	1 per ≤ 20 samples; if requested	1,1-Dichloroethene	59-172 %R	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	1,1-Dichloroethene	59-172 %R
		Trichloroethene	62-137 %R				Trichloroethene	62-137 %R
		Benzene	66-142 %R				Benzene	66-142 %R
		Toluene	59-139 %R				Toluene	59-139 %R
		Chlorobenzene	60-133 %R				Chlorobenzene	60-133 %R
Matrix Spike Duplicate	1 per ≤ 20 samples; if requested	1,1-Dichloroethene	0-22 %RPD	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Precision	1,1-Dichloroethene	0-22 %RPD
		Trichloroethene	0-24 %RPD				Trichloroethene	0-24 %RPD
		Benzene	0-21 %RPD				Benzene	0-21 %RPD
		Toluene	0-21 %RPD				Toluene	0-21 %RPD
		Chlorobenzene	0-21 %RPD				Chlorobenzene	0-21 %RPD
Deuterated Monitoring Compounds	all samples	Vinyl chloride-d3	68-122 %R	Check calculations and instruments, reanalyze affected samples up to 3 DMCs per sample may fail to meet necessary limits (Section 11.3.4, Page D45/SOM01.2)	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Vinyl chloride-d3	68-122 %R
		Chloroethane-d5	61-130 %R				Chloroethane-d5	61-130 %R

*with the exception of methylene chloride, 2-butanone & acetone which can be up to 2 times the CRQL. (USEPA CLP Nat'l Functional Guidelines, Final, July 2007)

**QAPP Worksheet #28-1
QC Samples Table
(Continued)**

Matrix	Soil
Analytical Group	VOC
Concentration Level	Low/Medium (mg/kg)
Sampling SOP(s)	SERAS SOP #2012
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	20

Lab QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds [cont'd]	all samples	1,1-Dichloroethene-d2	45-132 %R	Check calculations and instruments, reanalyze affected samples; up to 3 DMCs per sample may fail to meet necessary limits (Section 11.3.4, Page D45 of SOM01.2)	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	1,1-Dichloroethene-d2	45-132 %R
		2-Butanone-d5	20-182 %R				2-Butanone-d5	20-182 %R
		Chloroform-d	72-123 %R				Chloroform-d	72-123 %R
		1,2-Dichloroethane-d4	79-122 %R				1,2-Dichloroethane-d4	79-122 %R
		Benzene-d6	80-121 %R				Benzene-d6	80-121 %R
		1,2-Dichloropropane-d6	74-124 %R				1,2-Dichloropropane-d6	74-124 %R
		Toluene-d8	78-121 %R				Toluene-d8	78-121 %R
		trans-1,3-Dichloropropene-d4	72-130 %R				trans-1,3-Dichloropropene-d4	72-130 %R
		2-Hexanone-d5	17-184 %R				2-Hexanone-d5	17-184 %R
		1,4-Dioxane-d8	50-150 %R				1,4-Dioxane-d8	50-150 %R
		1,1,2,2-Tetrachloroethane-d2	56-161 %R				1,1,2,2-Tetrachloroethane-d2	56-161 %R

QAPP Worksheet #28-2 QC Samples Table

Matrix	Soil
Analytical Group	SVOC
Concentration Level	Low/Medium (mg/kg)
Sampling SOP(s)	SERAS SOP #2012
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	20

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Method Blank	1 per \leq 20 samples or whenever samples extracted	No analyte > CRQL*		Suspend analysis unit source recertified	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	No analyte > CRQL*	
Matrix Spike	1 per \leq 20 samples; if requested	Phenol	26-90 %R	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Phenol	26-90 %R
		2-Chlorophenol	25-102 %R				2-Chlorophenol	25-102 %R
		N-Nitroso-di-n-propylamine	41-126 %R				N-Nitroso-di-n-propylamine	41-126 %R
		4-Chloro-3-methylphenol	26-103 %R				4-Chloro-3-methylphenol	26-103 %R
		Acenaphthene	31-137 %R				Acenaphthene	31-137 %R
		4-Nitrophenol	11-114 %R				4-Nitrophenol	11-114 %R
		2,4-Dinitrotoluene	28-89 %R				2,4-Dinitrotoluene	28-89 %R
		Pentachloro-phenol	17-109 %R				Pentachloro-phenol	17-109 %R
		Pyrene	35-142 %R				Pyrene	35-142 %R
Matrix Spike Duplicate	1 per \leq 20 samples; if requested	Phenol	0-35 %RPD	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Precision	Phenol	0-35 %RPD
		2-Chlorophenol	0-50 %RPD				2-Chlorophenol	0-50 %RPD
		N-Nitroso-di-n-propylamine	0-38 %RPD				N-Nitroso-di-n-propylamine	0-38 %RPD

*with the exception of bis (2-Ethylhexyl) phthalate which can be up to 5 times the CRQL. (USEPA CLP Nat'l Functional Guidelines, Final, July 2007)

QAPP Worksheet #28-2 QC Samples Table

Matrix	Soil
Analytical Group	SVOC
Concentration Level	Low/Medium (mg/kg)
Sampling SOP(s)	SERAS SOP #2012
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	20

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Matrix Spike Duplicate [cont'd]	1 per ≤ 20 samples; if requested	4-Chloro-3- methylphenol	0-33 %RPD	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Precision	4-Chloro-3- methylphenol	0-33 %RPD
		Acenaphthene	0-19 %RPD				Acenaphthene	0-19 %RPD
		4-Nitrophenol	0-50 %RPD				4-Nitrophenol	0-50 %RPD
		2,4-Dinitrotoluene	0-47 %RPD				2,4-Dinitrotoluene	0-47 %RPD
		Pentachloro-phenol	0-47 %RPD				Pentachloro-phenol	0-47 %RPD
		Pyrene	0-36 %RPD				Pyrene	0-36 %RPD
Deuterated Monitoring Compounds	all samples	Phenol-d5	17-103 %R	Check calculations and instruments, reanalyze affected samples; up to 4 DMCs may fail to meet recovery limits (Section 11.3.4, Page D48/SVOC of SOM01.2)	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Phenol-d5	17-103 %R
		Bis(2-chloroethyl)ether- d8	12-98 %R				Bis(2-chloroethyl)ether- d8	12-98 %R
		2-Chlorophenol-d4	13-101 %R				2-Chlorophenol-d4	13-101 %R
		4-Methylphenol-d8	8-100 %R				4-Methylphenol-d8	8-100 %R
		Nitrobenzene-d5	16-103 %R				Nitrobenzene-d5	16-103 %R
		2-Nitrophenol-d4	16-104 %R				2-Nitrophenol-d4	16-104 %R

QAPP Worksheet #28-2 QC Samples Table

Matrix	Soil
Analytical Group	SVOC
Concentration Level	Low/Medium (mg/kg)
Sampling SOP(s)	SERAS SOP #2012
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	20

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds [cont'd]	all samples	2,4-Dichlorophenol-d3	23-104 %R	Check calculations and instruments, reanalyze affected samples; up to 4 DMCs may fail to meet recovery limits (Section 11.3.4, Page D48/SVOC of SOM01.2)	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	2,4-Dichlorophenol-d3	23-104 %R
		4-Chloroaniline-d4	1-145 %R				4-Chloroaniline-d4	1-145 %R
		Dimethylphthalate-d6	43-111 %R				Dimethylphthalate-d6	43-111 %R
		Acenaphthylene-d8	20-97 %R				Acenaphthylene-d8	20-97 %R
		4-Nitrophenol-d4	16-166 %R				4-Nitrophenol-d4	16-166 %R
		Fluorene-d10	40-108 %R				Fluorene-d10	40-108 %R
		4,6-Dinitro-2-methylphenol-d2	1-121 %R				4,6-Dinitro-2-methylphenol-d2	1-121 %R
		Anthracene-d10	22-98 %R				Anthracene-d10	22-98 %R
		Pyrene-d10	51-120 %R				Pyrene-d10	51-120 %R
		Benzo(a)pyrene-d12	43-111 %R				Benzo(a)pyrene-d12	43-111 %R

QAPP Worksheet #28-2
QC Samples Table

Matrix	Soil
Analytical Group	SVOC
Concentration Level	Low/Medium (mg/kg)
Sampling SOP(s)	SERAS SOP #2012
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	20

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Internal Standards	all samples	50-200% of area, \pm 30 sec retention time shift	Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	50-200% of area, \pm 30 sec retention time shift

QAPP Worksheet #28-3 QC Samples Table

Matrix	Soil
Analytical Group	Target Analyte List Inorganics – Metals
Concentration Level	Low (mg/kg)
Sampling SOP(s)	SERAS SOP #2012
Analytical Method/SOP Reference	ILM05.4
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	20

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation Blank	1 per \leq 20 samples	No constituent > CRQL	Suspend analysis until source rectified; redigest and reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	No constituent > CRQL
Spike	1 per \leq 20 samples	75-125%R*	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	75-125%R*
Duplicate	1 per \leq 20 samples	\pm 20% RPD**	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Precision	\pm 20% RPD**
Post-Digestion Spike	after any analyte (except Ag and Hg) fails spike %R	75-125%R	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	75-125%R
Interference Check Sample [ICP Analysis Only]	beginning, end and periodically during run (2 times every 8 hours)	Within \pm 2 times CRQL of true value or \pm 20% of true value, whichever is greater	Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Sensitivity	Within \pm 2 times CRQL of true value or \pm 20% of true value, whichever is greater

*except when the sample concentration is greater than 4 times the spike concentration, then disregard the recoveries; no data validation action taken

**Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP - (include absolute difference criteria)

**except when the sample and/or duplicate concentrations are less than 5 times the CRQL, then \pm CRQL.

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP
Revision Number: 0.0
Revision Date: 06/23/10
Page: 62 of 88

QAPP Worksheet #28-3 QC Samples Table

Matrix	Soil
Analytical Group	Target Analyte List Inorganics – Metals
Concentration Level	Low (mg/kg)
Sampling SOP(s)	SERAS SOP #2010
Analytical Method/SOP Reference	ILM05.4
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	20

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory Control Sample	1 per \leq 20 samples	Control limits established by EPA*	Suspend analysis until source rectified; redigest and reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	Control limits established by EPA*

* If the EPA LCS is unavailable, other EPA QC samples or other certified materials may be used. In such cases, control limits for the LCS must be documented and provided.

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP
Revision Number: 0.0
Revision Date: 06/23/10
Page: 63 of 88

QAPP Worksheet #28-4 QC Samples Table

Matrix	Soil
Analytical Group	Target Analyte List Inorganics –Total Mercury
Concentration Level	Low (mg/kg)
Sampling SOP(s)	SERAS SOP #2012
Analytical Method/SOP Reference	ILM05.4 – Cold Vapor Atomic Absorption (CVAA)
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	20

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation Blank (PB)	1 per ≤ 20 samples	No analyte > CRQL	Suspend analysis; redigest and reanalyze	EPA CLP RAS Laboratory Technician	Accuracy	No analyte > CRQL
Duplicate Sample	1 per ≤ 20 samples	$\pm 20\%$ RPD	Flag outliers	EPA CLP RAS Laboratory Technician	Precision	$\pm 20\%$ RPD
Spike Sample	1 per ≤ 20 samples	75 – 125 %R	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	75 – 125 %R
Laboratory Control Sample	1 ≤ 20 samples	Control limits established by EPA*	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	Control limits established by EPA*

* If the EPA LCS is unavailable, other EPA QC samples or other certified materials may be used. In such cases, control limits for the LCS must be documented and provided.

QAPP Worksheet #28-5 **QC Samples Table**

Matrix	Soil
Analytical Group	Target Analyte List Inorganics – Total Cyanide
Concentration Level	Low (mg/kg)
Sampling SOP(s)	SERAS SOP #2012
Analytical Method/SOP Reference	ILM05.4 – Colorimeter or Spectrophotometer
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	20

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation Blank (PB)	1 per \leq 20 samples	No analyte > CRQL	Suspend analysis; redigest and reanalyze	EPA CLP RAS Laboratory Technician	Accuracy	No analyte > CRQL
Duplicate Sample	1 per \leq 20 samples	\pm 20% RPD	Flag outliers	EPA CLP RAS Laboratory Technician	Precision	\pm 20% RPD
Spike Sample	1 per \leq 20 samples	75 – 125 %R	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	75 – 125 %R
Laboratory Control Sample	1 \leq 20 samples	Control limits established by EPA*	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	Control limits established by EPA*

* If the EPA LCS is unavailable, other EPA QC samples or other certified materials may be used. In such cases, control limits for the LCS must be documented and provided.

QAPP Worksheet #28-6 QC Samples Table

Matrix	Aqueous
Analytical Group	VOC
Concentration Level	Low (ug/L)
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	10

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Method Blank	1 every 12 hours	No analyte > CRQL*		Suspend analysis unit source recertified	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	No analyte > CRQL*	
Matrix Spike (Not Required)	1 per ≤ 20 samples; if requested	1,1-Dichloroethene	61-145 %R	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	1,1- Dichloroethene	61-145 %R
		Benzene	76-127 %R				Benzene	76-127 %R
		Trichloroethene	71-120 %R				Trichloroethene	71-120 %R
		Toluene	76-125 %R				Toluene	76-125 %R
		Chlorobenzene	75-130 %R				Chlorobenzene	75-130 %R
Matrix Spike Duplicate (Not Required)	1 per ≤ 20 samples; if requested	1,1-Dichloroethene	0-14 %RPD	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Precision	1,1- Dichloroethene	0-14 %RPD
		Benzene	0-11 %RPD				Benzene	0-11 %RPD
		Trichloroethene	0-14 %RPD				Trichloroethene	0-14 %RPD

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds	all samples	Toluene	0-13 %RPD				Toluene	0-13 %RPD
		Chlorobenzene	0-13 %RPD				Chlorobenzene	0-13 %RPD
		Vinyl chloride-d3	65-131 %R	Check calculations and instruments, reanalyze affected samples; see asterisk below	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Vinyl chloride-d3	65-131 %R
		Chloroethane-d5	71-131 %R				Chloroethane-d5	71-131 %R

*with the exception of methylene chloride, 2-butanone and acetone which can be up to 2 times the CRQL.

QAPP Worksheet #28-6 QC Samples Table

Matrix	Aqueous
Analytical Group	VOC
Concentration Level	Low (ug/L)
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	10

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds [cont'd]	all samples	1,1-Dichloroethene-d2	55-104 %R	Check calculations and instruments, reanalyze affected samples; *up to 3 DMCs per sample may fail to meet recovery limits	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	1,1-Dichloroethene-d2	55-104 %R
		2-Butanone-d5	49-155 %R				2-Butanone-d5	49-155 %R
		Chloroform-d	78-121 %R				Chloroform-d	78-121 %R
		1,2-Dichloroethane-d4	78-129 %R				1,2-Dichloroethane-d4	78-129 %R
		Benzene-d6	77-124 %R				Benzene-d6	77-124 %R
		1,2-Dichloropropane-d6	79-124 %R				1,2-Dichloropropane-d6	79-124 %R
		Toluene-d8	77-121 %R				Toluene-d8	77-121 %R
		trans-1,3-Dichloropropene-d4	73-121 %R				trans-1,3-Dichloropropene-d4	73-121 %R
		2-Hexanone-d5	28-135 %R				2-Hexanone-d5	28-135 %R

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
		1,4-Dioxane-d8	50-150 %R				1,4-Dioxane-d8	50-150 %R
		1,1,2,2-Tetrachloroethane-d2	73-125 %R				1,1,2,2-Tetrachloroethane-d2	73-125 %R

QAPP Worksheet #28-6 QC Samples

Matrix	Aqueous
Analytical Group	VOC
Concentration Level	Low (ug/L)
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	10

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds [cont'd]	all samples	1,2-Dichlorobenzene-d4	80-131 %R	Check calculations and instruments, reanalyze affected samples; *up to 3 DMCs per sample may fail to meet recovery limits	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	1,2-Dichlorobenzene-d4	80-131 %R
Internal Standards	all samples	60-140%		Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	± 40 % of response area, ± 20 sec retention time shift	

QAPP Worksheet #28-7 QC Samples Table

Matrix	Aqueous
Analytical Group	SVOC
Concentration Level	Low (ug/L)
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	10

Lab QC Sample:	Frequency / Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Method Blank	1 per ≤ 20 samples OR whenever samples extracted	No analyte > CRQL*		Suspend analysis unit source recertified	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	No analyte > CRQL	
Matrix Spike (Not Required)	1 per ≤ 20 samples; if requested	Phenol	12-110 %R	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Phenol	12-110 %R
		2-Chlorophenol	27-123 %R				2-Chlorophenol	27-123 %R
		N-Nitroso-di-n-propylamine	41-116 %R				N-Nitroso-di-n-propylamine	41-116 %R
		4-Chloro-3-methylphenol	23-97 %R				4-Chloro-3-methylphenol	23-97 %R
		Acenaphthene	46-118 %R				Acenaphthene	46-118 %R
		4-Nitrophenol	29-94 %R				4-Nitrophenol	29-94 %R
		2,4-Dinitrotoluene	24-96 %R				2,4-Dinitrotoluene	24-96 %R
		Pentachlorophenol	9-103 %R				Pentachlorophenol	9-103 %R
		Pyrene	26-127 %R				Pyrene	26-127 %R

*with the exception of bis (2-Ethylhexyl) phthalate which can be up to 5 times the CRQL. (USEPA CLP Nat'l Functional Guidelines, Final, July 2007)

**QAPP Worksheet #28-7
QC Samples Table**

Matrix	Aqueous
Analytical Group	SVOC
Concentration Level	Low (ug/L)
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	10

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Matrix Spike Duplicate (Not Required)	1 per ≤ 20 samples; if requested	Phenol	0-42 %RPD	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Precision	Phenol	0-42 %RPD
		2-Chlorophenol	0-40 %RPD				2-Chlorophenol	0-40 %RPD
		N-Nitroso-di-n-propylamine	0-38 %RPD				N-Nitroso-di-n-propylamine	0-38 %RPD
		4-Chloro-3-methylphenol	0-42 %RPD				4-Chloro-3-methylphenol	0-42 %RPD
		Acenaphthene	0-31 %RPD				Acenaphthene	0-31 %RPD
		4-Nitrophenol	0-50 %RPD				4-Nitrophenol	0-50 %RPD
		2,4-Dinitrotoluene	0-38 %RPD				2,4-Dinitrotoluene	0-38 %RPD
		Pentachlorophenol	0-50 %RPD				Pentachlorophenol	0-50 %RPD
		Pyrene	0-31 %RPD				Pyrene	0-31 %RPD
Deuterated Monitoring	all samples	Phenol-d5	39-106 %R	Check calculations	EPA CLP RAS Laboratory	Accuracy	Phenol-d5	39-106 %R
		Bis(2-chloroethyl)ether-d8	40-105 %R				Bis(2-chloroethyl)ether-d8	40-105 %R

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Compounds		2-Chlorophenol-d4	41-106 %R	and instruments, reanalyze affected samples; up to 4 DMCs may fail to meet recovery limits	GC/MS Technician		2-Chlorophenol-d4	41-106 %R

QAPP Worksheet #28-7 QC Samples Table

Matrix	Aqueous
Analytical Group	SVOC
Concentration Level	Low (ug/L)
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	10

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds [cont'd]	all samples	4-Methylphenol-d8	25-111 %R	Check calculations and instruments, reanalyze affected samples; up to 4 DMCs may fail to meet recovery limits	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	4-Methylphenol-d8	25-111 %R
		Nitrobenzene-d5	43-108 %R				Nitrobenzene-d5	43-108 %R
		2-Nitrophenol-d4	40-108 %R				2-Nitrophenol-d4	40-108 %R
		2,4-Dichlorophenol-d3	37-105 %R				2,4-Dichlorophenol-d3	37-105 %R
		4-Chloroaniline-d4	1-145 %R				4-Chloroaniline-d4	1-145 %R
		Dimethylphthalate-d6	47-114 %R				Dimethylphthalate-d6	47-114 %R
		Acenaphthylene-d8	41-107 %R				Acenaphthylene-d8	41-107 %R
		4-Nitrophenol-d4	33-116 %R				4-Nitrophenol-d4	33-116 %R
		Fluorene-d10	42-111 %R				Fluorene-d10	42-111 %R
		4,6-Dinitro-2-methylphenol-d2	22-104 %R				4,6-Dinitro-2-methylphenol-d2	22-104 %R
		Anthracene-d10	44-110 %R				Anthracene-d10	44-110 %R
		Pyrene-d10	52-119 %R				Pyrene-d10	52-119 %R

QAPP Worksheet #28-7 QC Samples Table

Matrix	Aqueous
Analytical Group	SVOC
Concentration Level	Low (ug/L)
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	10

Lab QC Sample:	Frequency / Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds [cont'd]	all samples	Benzo(a)pyrene-d12	32-121 %R	Check calculations and instruments, reanalyze affected samples; up to 4 DMCs may fail to meet recovery limits	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Benzo(a)pyrene-d12	32-121 %R
Internal Standards	all samples	50-100% of area, \pm 20 sec retention time shift		Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	50-100% of area, \pm 20 sec retention time shift	

QAPP Worksheet #28-8 QC Samples Table

Matrix	Aqueous
Analytical Group	Target Analyte List Inorganics Metals
Concentration Level	Low (ug/L)
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	ILM05.4
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	10

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation Blank	1 per \leq 20 samples	No constituent > CRQL	Suspend analysis until source rectified; redigest and reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	No constituent > CRQL
Spike	1 per \leq 20 samples	75-125%R*	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	75-125%R*
Duplicate	1 per \leq 20 samples	\pm 20% RPD**	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Precision	\pm 20% RPD**
Post-Digestion Spike	after any analyte (except Ag and Hg) fails spike %R	75-125%R	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	75-125%R
Interference Check Sample [ICP Analysis Only]	beginning, end and periodically (not less than once per 20 samples)	\pm 2 times CRQL of true value or \pm 20% of true value, whichever is greater	Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Sensitivity	\pm 2 times CRQL of true value or \pm 20% of true value, whichever is greater

*except when the sample concentration is greater than 4 times the spike concentration, then disregard the recoveries; no data validation action taken

**Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP - (include absolute difference criteria)

**except when the sample and/or duplicate concentration is less than 5 times the CRQL, then \pm CRQL.

QAPP Worksheet #28-8 QC Samples Table

Matrix	Aqueous
Analytical Group	Target Analyte List Inorganics Metals
Concentration Level	Low (ug/L)
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	ILM05.4
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	10

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory Control Sample	1 per \leq 20 samples	80-120%R (except Ag and Sb)	Suspend analysis until source rectified; redigest and reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	80-120%R (except Ag and Sb)

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP
Revision Number: 0.0
Revision Date: 06/23/10
Page: 77 of 88

QAPP Worksheet #28-9 QC Samples Table

Matrix	Aqueous
Analytical Group	Target Analyte List Inorganics – Total Mercury
Concentration Level	Low (ug/L)
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	ILM05.4 – Cold Vapor Atomic Absorption (CVAA)
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	10

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation Blank (PB)	1 per \leq 20 samples	No analyte > CRQL	Suspend analysis; redigest and reanalyze	EPA CLP RAS Laboratory Technician	Accuracy	No analyte > CRQL
Duplicate Sample	1 per \leq 20 samples	\pm 20% RPD*	Flag outliers	EPA CLP RAS Laboratory Technician	Precision	\pm 20% RPD
Spike Sample	1 per \leq 20 samples	75 – 125 %R	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	75 – 125 %R

*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP - (include absolute difference criteria)

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP
Revision Number: 0.0
Revision Date: 06/23/10
Page: 78 of 68

QAPP Worksheet #28-10 QC Samples Table

Matrix	Aqueous
Analytical Group	Target Analyte List Inorganics - Total Cyanide
Concentration Level	Low (ug/L)
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	ILM05.4 – Colorimeter or Spectrophotometer
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	10

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation Blank (PB)	1 per \leq 20 samples	No analyte > CRQL	Suspend analysis; redistill and reanalyze	EPA CLP RAS Laboratory Technician	Accuracy	No analyte > CRQL
Duplicate Sample	1 per \leq 20 samples	\pm 20% RPD*	Flag outliers	EPA CLP RAS Laboratory Technician	Precision	\pm 20% RPD
Spike Sample	1 per \leq 20 samples	75 – 125 %R	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	75 – 125 %R

*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP - (include absolute difference criteria)

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP

Revision Number: 0.0

Revision Date: 06/23/10

Page: 79 of 88

QAPP Worksheet #29
Project Documents and Records Table

Sample Collection Documents and Records	Analysis Documents and Records	Data Assessment Documents and Records	Other
Site and field logbooks Boring logs COC forms Field Data Sheets	Sample receipt logs Internal and external COC forms Equipment calibration logs Sample preparation worksheets/logs Sample analysis worksheets/run logs Telephone/email logs Corrective action documentation	Data validation reports Field inspection checklist(s) Laboratory Audit checklist (if performed) Review forms for electronic entry of data into database Corrective action documentation	Trip Report

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP
Revision Number: 0.0
Revision Date: 06/23/10
Page: 80 of 88

QAPP Worksheet #30
Analytical Services Table

Matrix	Analytical Group	Concentration Level	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Soil	TCL VOCs TCL SVOCs	Low	SOM01.2	6 weeks	CLP-assigned Laboratory	NA
Soil	TAL Metals Cyanide	Low	ILM05.4	6 weeks	CLP-assigned Laboratory	NA
Aqueous	TCL VOCs TCL SVOCs TAL Metals Cyanide	Low	SOM01.2 ILM05.4	6 weeks	CLP-assigned Laboratory	NA

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP
Revision Number: 0.0
Revision Date: 06/23/10
Page: 81 of 88

QAPP Worksheet #31
Planned Project Assessments Table

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of Corrective Actions (Title and Organizational Affiliation)
Laboratory Technical Systems/ Performance Audits	NA	External	Regulatory Agency	Regulatory Agency	EPA CLP RAS Laboratory	EPA CLP RAS Laboratory	EPA or other Regulatory Agency
Performance Evaluation Samples	NA	External	Regulatory Agency	Regulatory Agency	EPA CLP RAS Laboratory	EPA CLP RAS Laboratory	EPA or other Regulatory Agency

NA = Not Available

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP
Revision Number: 0.0
Revision Date: 06/23/10
Page: 82 of 88

QAPP Worksheet #32
Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Timeframe for Response
Project Readiness Review	Checklist or logbook entry	Martin Ebel, Task Leader, SERAS	Immediately to within 24 hours of review	Checklist or logbook entry	Martin Ebel, Task Leader, SERAS	Immediately to within 24 hours of review
Field Observations/ Deviations from Work Plan	Logbook	Martin Ebel, Task Leader, SERAS	Immediately to within 24 hours of deviation	Logbook	Martin Ebel, Task Leader, SERAS and EPA RPM	Immediately to within 24 hours of deviation
Laboratory Technical Systems/ Performance Audits	Written Report	EPA CLP Laboratory	30 days	Letter	EPA CLP Laboratory	14 days
On-Site Field Inspection	Written Report	Martin Ebel, Task Leader, SERAS	7 calendar days after completion of the audit	Letter/Internal Memorandum	Martin Ebel, Task Leader, SERAS and EPA RPM	To be identified in the cover letter of the report
Performance Evaluation Samples	Electronic Report	EPA CLP Laboratory	30 days	Letter or Written Report	EPA CLP Laboratory	14 days

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP
Revision Number: 0.0
Revision Date: 06/23/10
Page: 83 of 88

QAPP Worksheet #33
QA Management Reports Table

Type of Report	Frequency (daily, weekly monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
Technical Report	Monthly	10 th of the Month following each performance period	SERAS TL	ERT Project Officer & WAM
QA Report	Quarterly	February, May, August and November	SERAS QA/QC Officer	ERT Project Officer & Quality Coordinator

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP
Revision Number: 0.0
Revision Date: 06/23/10
Page: 84 of 88

QAPP Worksheet #34
Verification (Step I) Process Table

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Chain-of-custody record	Original chain-of-custody records will be reviewed for correctness and completeness prior to submittal of samples to the laboratory.	Internal	Martin Ebel, SERAS
Laboratory analytical data package	Data packages will be reviewed/verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal.	External	CLP Laboratories
	Reviewed for measurement performance criteria	External	ESAT Contractor
Trip Report	Deliverable will be reviewed to verify that transcription errors are not present.	Internal	Peer review team

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP
Revision Number: 0.0
Revision Date: 06/23/10
Page: 85 of 88

QAPP Worksheet #35
Validation (Steps IIa and IIb) Process Table

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	SOPs	Ensure that the sampling methods/procedures outlined in QAPP were followed, and that any deviations were noted/approved.	Martin Ebel, SERAS Task Leader
IIb	SOPs	Determine potential impacts from noted/approved deviations, in regard to PQOs.	ESAT Data Validation Personnel, EPA Region II, ERT WAM
IIa	Chains of custody	Examine COC forms against QAPP and laboratory contract requirements (e.g., analytical methods, sample identification, etc.).	ESAT Data Validation Personnel, EPA Region II Martin Ebel, SERAS Task Leader
IIa	Laboratory data package	Examine packages against QAPP and laboratory contract requirements, and against COC forms (e.g., holding times, sample handling, analytical methods, sample identification, data qualifiers, QC samples, etc.).	ESAT Data Validation Personnel, EPA Region II
IIb	Laboratory data package	Determine potential impacts from noted/approved deviations, in regard to PQOs. Examples include PQLs and QC sample limits (precision/accuracy).	ESAT Data Validation Personnel, EPA Region II
IIb	Field duplicates	Compare results of field duplicate (or replicate) analyses with RPD criteria	Martin Ebel, SERAS Task Leader Don Bussey, ERT WAM

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP
Revision Number: 0.0
Revision Date: 06/23/10
Page: 86 of 88

QAPP Worksheet #36
Validation (Steps IIa and IIb) Summary Table

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa / IIb	Soil/Aqueous	VOCs	Low	Data Validation SOP for Organic Analysis of Low/Medium Concentration VOCs under SOW SOM01.2	ESAT Data Validation Personnel, EPA Region 2 Data Validation Personnel
		SVOCs		Data Validation SOP for Organic Analysis of Low/Medium Concentration SVOCs under SOW SOM01.2	ESAT Data Validation Personnel, EPA Region 2 Data Validation Personnel
		Metals		Data Validation SOP for Inorganic Analysis of Low/Medium Concentration Total Metals under SOW ILM0 5.4	ESAT Data Validation Personnel, EPA Region 2 Data Validation Personnel

QAPP Worksheet #37

Usability Assessment

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used: The soil analytical data will be correlated with the MIPs data using least mean squared error procedures and usability will be based on the degree of correlation.
The usability of the groundwater analytical data will be determined through standard contouring procedures
Describe the evaluative procedures used to assess overall measurement error associated with the project: The measurement error will be determined based on standard laboratory procedures, such as analysis of field duplicates and matrix spike and matrix spike duplicates.
Identify the personnel responsible for performing the usability assessment: EPA Region 2, ERT WAM, SERAS
Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:

Precision: Results of laboratory duplicates will be assessed during data validation and data will be qualified according to the data validation procedures cited in worksheet# 36. Field duplicates will be assessed during by matrix using the RPD for each pair of results above the QL for the performed analyses. RPD acceptance criteria, presented in worksheet #12, will be used to access field sampling precision. Absolute difference will be used for low results as described in worksheet # #28. A discussion summarizing the results of laboratory and field precision and any limitations on the use of the data will be described.

-Accuracy/Bias Contamination: Results for all laboratory blanks will be assessed as part of the data validation. During the data validation process, the validating personnel will qualify the data following the procedures described on worksheet #36. A discussion summarizing the results of the laboratory accuracy and bias based on contamination will be presented and any limitations on the use of the data will be described.

-Overall Accuracy/Bias: The results of instrument calibration and matrix spike recoveries will be reviewed and data will be qualified according to the data validation procedures cited on worksheet #36. A discussion summarizing the results of laboratory accuracy and any limitations on the use of the data will be described.

-Sensitivity: Data results will be compared to criteria provided in worksheet #15. A discussion summarizing any conclusions about the sensitivity of the analyses will be presented and any limitations on the use of the data will be described.

-Representativeness: Data representativeness will be assessed by collecting field replicate samples. The field replicates are by definition equally representative of a given point and space and time. Representativeness is a qualitative parameter which is dependent upon the proper design of the sampling program and proper laboratory protocol. Therefore, data representativeness will be satisfied by ensuring that:

The sampling program is followed according to:

U.S. EPA (Environmental Protection Agency). October 1989. *Region II CERCLA Quality Assurance Manual*. Final Copy, Revision 1. Division of

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP
Revision Number: 0.0
Revision Date: 06/23/10
Page: 88 of 88

Environmental Services and Assessment, Edison, NJ; and

U.S. EPA (Environmental Protection Agency). December 1995. *Superfund Program Representative Sampling Guidance*. OSWER Directive 9360.4-10. Interim Final. EPA/540/R-95/141. Office of Emergency and Remedial Response (OERR). Washington, D.C.

U.S. EPA Environmental Response Team. *Standard Operating Procedure 2012 Soil Sampling*, February 2000, *Standard Operating Procedure 2007, Groundwater Well Sampling*, January 1995.

-Comparability: To ensure data comparability, sampling and analysis for all samples will be performed using standardized analytical methods and adherence to the quality control procedures outlined in the methods and this QAPP. Therefore, the data will be comparable.

-Reconciliation: The PQOs presented in worksheet #11 will be examined against the data quality to determine if the objectives were met. This examination will include a combined overall assessment of the results of each analysis pertinent to an objective. Each analysis will first be evaluated separately in terms of major impacts observed from data validation, data quality indicators, and measurement performance criteria assessments. Based on the results of these assessments, the quality of the data will be determined. Based on the quality determined, the usability of the data for each analysis will be determined. Based on the combined usability of the data from all analyses for an objective, it will be determined if the PQOs were met and whether project goals are being achieved. Conclusions will be drawn and any limitations on the usability of the data will be described.

-Completeness: 1. To calculate field precision: $RPD = 100 \times \left(\frac{|X_1 - X_2|}{(X_1 + X_2)/2} \right)$ where X1 and X2 are the reported concentrations for each duplicate or replicate.

2. Calculate completeness: Data completeness will be expressed as the percentage of valid data obtained from measurement system. In other words, every well or location that was initially intended to be sampled, was sampled. For data to be considered valid, it must meet all the acceptable criteria including accuracy and precision, as well as any other criteria specified by the analytical method used. Therefore, all data points critical to the sampling program in terms of completeness will be 100% validated by USEPA Region II DESA/LB according to the appropriate and current US EPA Region 2 Data Validation SOPs G-26. With 100% validation, the rationale for considering data points non-critical is not required.

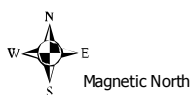


Map created using 2007 orthoimagery from NJGIN.

Map Creation Date: 11 May 2010

Coordinate system: New Jersey State Plane
 FIPS: 2900
 Datum: NAD83
 Units: Feet

200 0 200 Feet



Legend

● Sample Location



U.S EPA Environmental Response Team
 Scientific Engineering Response and Analytical Services
 EP-W-09-031
 W.A.# 0-089

Figure 1
 Site Location Map
 29 Riverside Ave. (Phase 2 Assessment)
 Newark, New Jersey

Data: g:\arcviewprojects\SERAS01\00-089
 MXD file: g:\arcviewprojects\SERAS01\SER00089_RiversideNewark
 \089_Sample_Location_Map_f1rev001
 Revision Number: 001